TOOLING & PRODUCTION

BOOMING NEW TECHNOLOGICAL GIANT:
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JANUARY 1957

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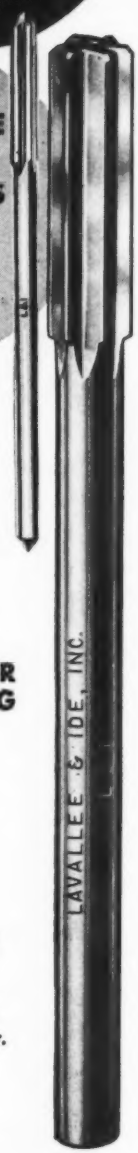

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CIRCLE INFORM-A-GRAM KEY NO. 4

TOOLING & PRODUCTION Magazine

JANUARY 1957
VOL. XXII—No. 10
GEORGE J. HUEBNER, Founder

Personally Speaking

Dear T&P Reader:

With the January 1957 issue of Tooling & Production, for the first time in over 20 years, there will be no advertisement on our front cover.

Some of you have been queried recently by our editorial research staff and one of the things we discovered most of you wanted was a front cover without an ad. We agree. So we decided to run our table of contents there for your convenience.

You will find a lot of changes in Tooling & Production in the next several months. Some will be quite noticeable but others will be hardly visible. All of them will be made for you . . . that you might have a more readable (or scanable) trade magazine keeping you posted on the latest in the world of metalworking tooling and manufacturing production.

I know you can't be expected to get your skull very hot over the way Tooling & Production is edited and written — from a writing point of view, that is. But I've got a sneaking hunch that you do have a very definite opinion of each article as it communicates to you. Has it given you additional information? Has it clearly explained the solution of a tough problem that you can use in your plant? Was it interesting to you?

These things you know.

Whether you like to read a magazine depends on so many factors too numerous to mention here. But I can assure you all of these factors are under continual scrutiny by our editors and the entire publishing staff. Many a long discussion is held over what might seem at first glance to be a mighty small point. But out of these long (and sometimes painful) discussions will come changes always, we hope, for the better.

All of us on the T&P staff hope you'll like our changes in 1957. But whatever you think of them drop me a line. I'd surely appreciate hearing from you.

Sincerely yours,

Ray L. Huebner

Publisher

P.S. Hope you're getting off to a great start on the best year you've ever had.

BPA

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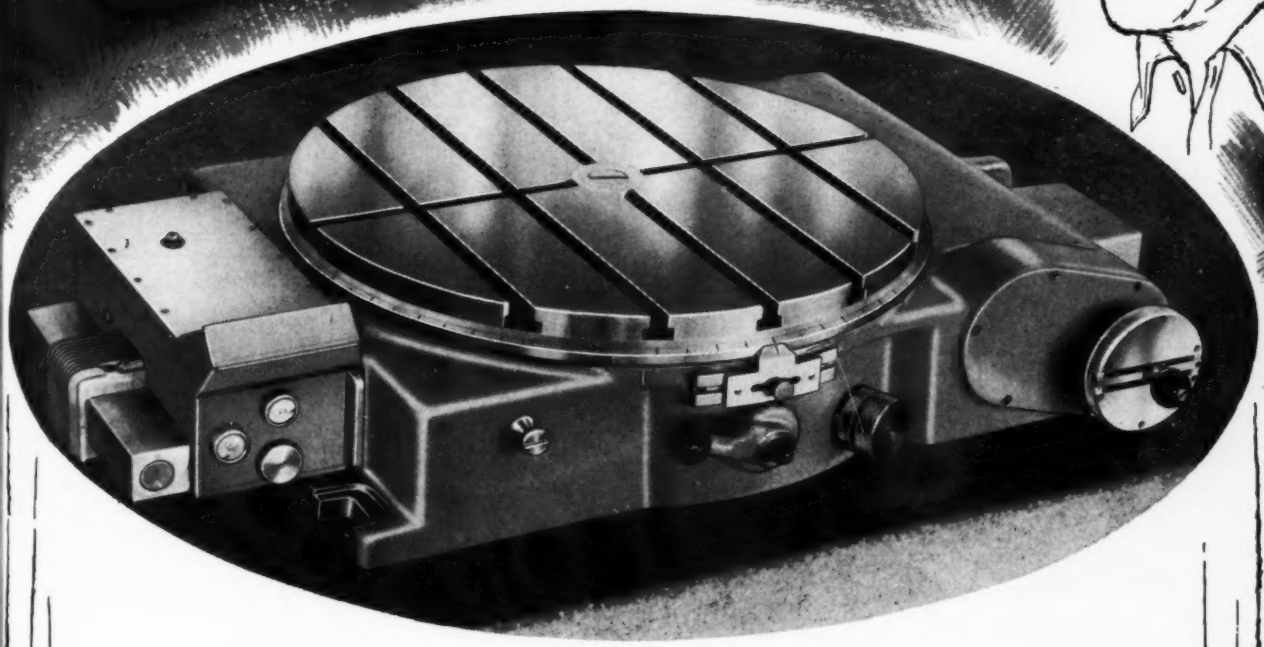
CIRCLE INFORM-A-GRAM KEY NO. 6

NO SECOND GUESSING
when you set THIS table . . .



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CIRCLE INFORM-A-GRAM KEY NO. 7

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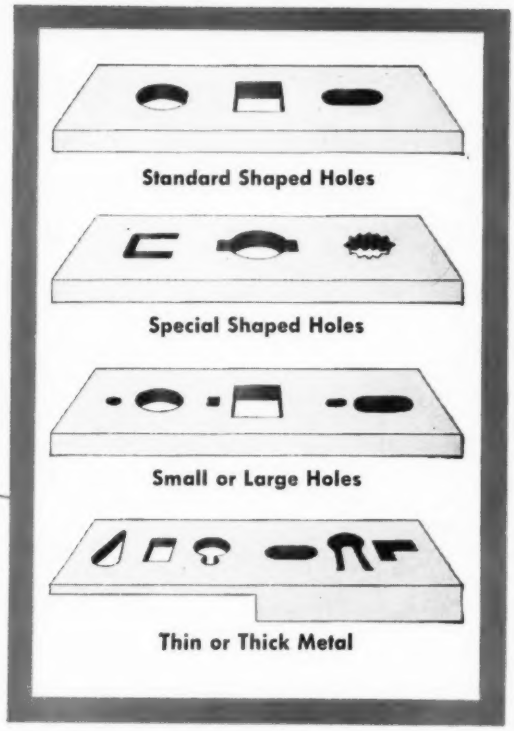

What are your piercing or forming requirements—standard or unusual shapes—small or large holes—steel or special alloys—thin or thick metals? Many hole-making applications, formerly requiring drilling or some other costly means, can now be done with R-B interchangeable punches. If you have thought your piercing jobs too tough for interchangeable punches, it will pay you to investigate the wide application potential of R-B standardized equipment.

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CIRCLE INFORM-A-GRAM KEY NO. 8

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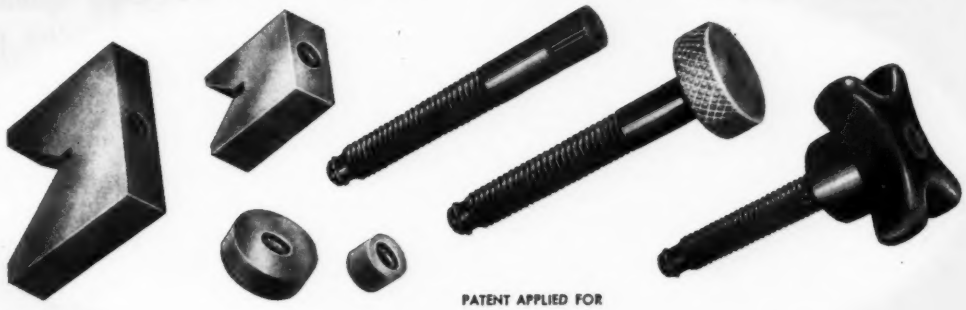
ALL TYPES ARE INTERCHANGEABLE WITH *"SNAP ON-SNAP OFF"* ROUND OR V-PADS



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SIZES — ¼-20 to ⅝-11 **LENGTHS — 1" up to 5¼"**

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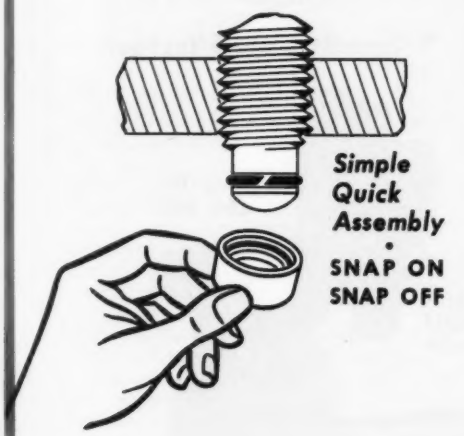
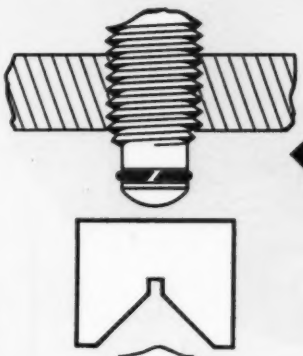
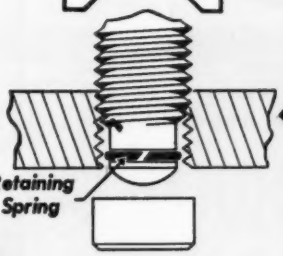


Simple Quick Assembly
•
SNAP ON SNAP OFF



10° ADJUSTMENT in all directions

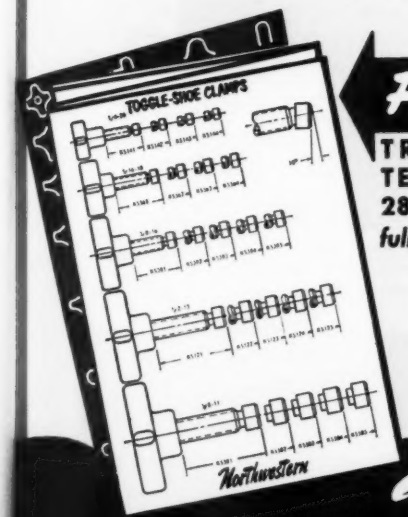
Retaining spring holds shoe in place yet allows a full 10° adjustment in all directions.



Retaining Spring

NO INTERFERENCE
Shoe only 1/16 larger than bolt

Short shoe design requires a minimum distance between fixture and the work.



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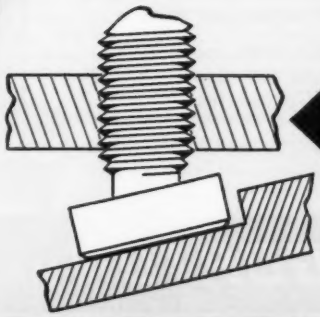

HEAT TREATED for max. toughness

Screw is heat treated for long life—shoe is heat treated to prevent marring of work.

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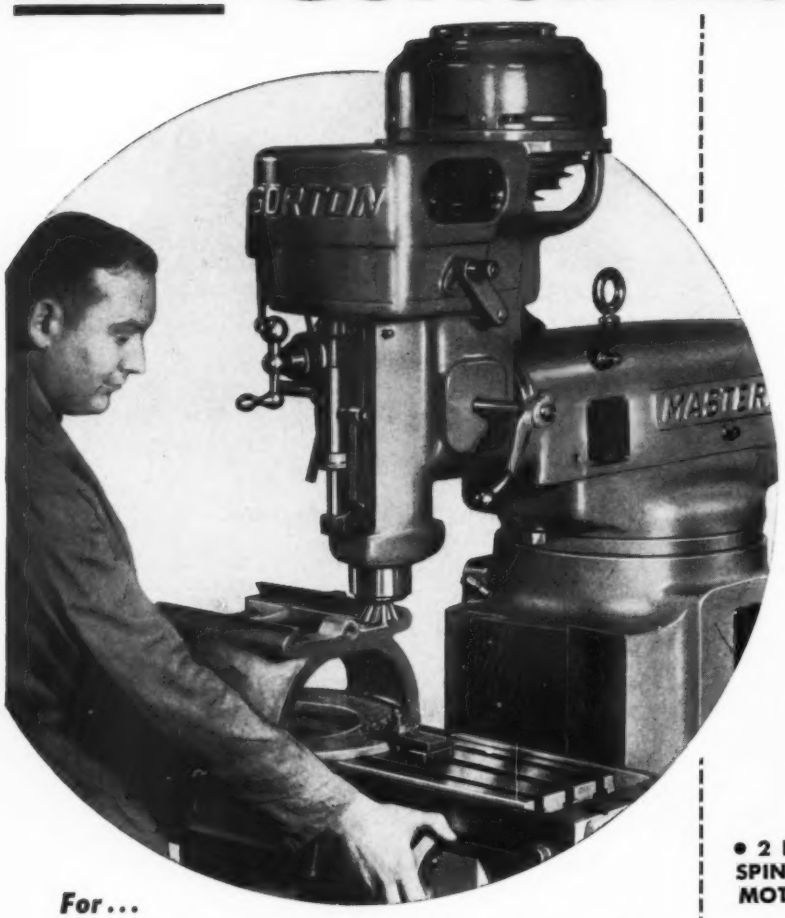
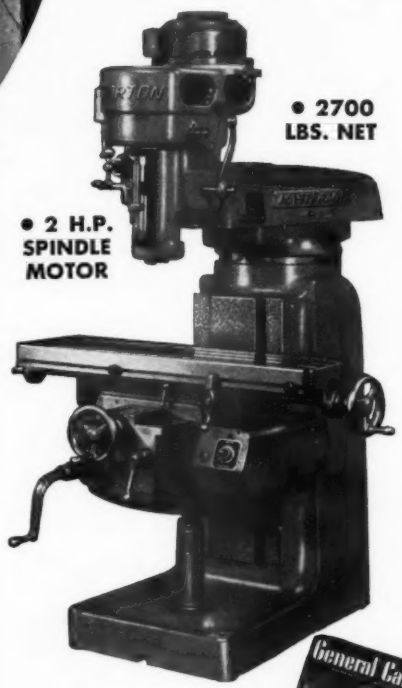
NEW Gorton Mastermil



- Precision spindle; 10 speeds, 80-5600 R.P.M. standard
- Designed and built to provide sustained accuracy
- Longitudinal Feed, 22 inches
- Saddle length, 24 inches
- Cross feed, 10½ inches
- Vertical feed of knee, 15¼ inches
- Spindle feed, 4 inches



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CIRCLE INFORM-A-GRAM KEY NO. 10

Talk of the Month

by Philip R. Marsilius
Vice President
THE PRODUCTO MACHINE CO.
Bridgeport, Conn.
and First Vice President
NATIONAL TOOL & DIE
MANUFACTURERS ASSOCIATION

APPRENTICESHIP:
Why, Who and How

THE SHORTAGE OF SKILLED WORKERS in the United States can be demonstrated from a number of sources. A recent study published by the U. S. Department of Labor pointed out that at the end of 1955, we had a population of approximately 167-million persons and a skilled work force of some 9-million, including all trades and including technicians within the trades.

The metal trades had about 1.2-million of the 9-million. Within this group we realize that people acquire their skills in various ways — experience, schools, industry training and armed services, as well as apprenticeship.

The Department of Labor further states that in this Country we need about 250,000 new skilled workers each year just to replace those who die, retire or leave the field.

Approved apprenticeship programs registered with the Department of Labor produce about 40,000 graduates annually. Approximately the same number come from programs not registered. This leaves a wide gap to be filled by other means — experience, limited training, schooling, etc. No provision has been made for the expansion of the economy with a growing population or for defense emergency requirements.

Now that we have taken a brief look at the overall picture, let's turn to our own problem. In an address earlier this year, W. F. Patterson, Director of the Bureau of Apprenticeship-U. S. Department of Labor, said, "Machinists and Tool and Die Makers are the lifeblood of the production stream. It is an admitted fact that there are shortages in the machining trades.

"A fallacy that contributes to the shortage of skilled artisans is that when you build skill into a machine, skill in man is no longer required.

"But who builds skill into a machine?

"Although technological advances are helping to meet increased production demands, mechanization demands call for a vast increase in the number of skilled workers."

Again, from one of our industrial unions comes this report of a recently conducted survey: about 49% of their skilled worker members would retire within the next 10 years. "Retire" here would be construed to include those dying, transferring out or being promoted. Still, it is a startling revelation which can only mean the average age of their skilled workers is exceptionally high, and the shortage is due to become even more acute.

Situation Merits Evaluation

Many of our large manufacturing plants who have for years maintained fine apprentice training programs, often over and beyond their

. . . *Continued on Page 13*

A talk presented at the past Annual Meeting of the Pressed Metal Institute.

Appliance manufacturer forms flat stock to scroll shape.

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Simple and complex bends are being formed at low cost in daily production across the nation with hydraulically operated Di-Acro Benders. The Bender can be delivered completely tooled by the factory for bending tubing, moulding, extrusions and special materials. For a free production estimate, send a dimensional sketch and sample material for your component.

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pronounced die-ack-ro

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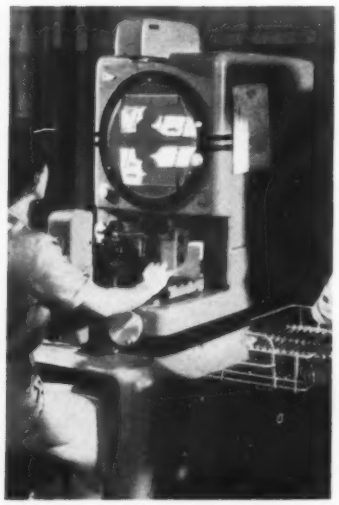
O'NEIL-IRWIN MFG. CO., 315 8th Ave., Lake City, Minn.

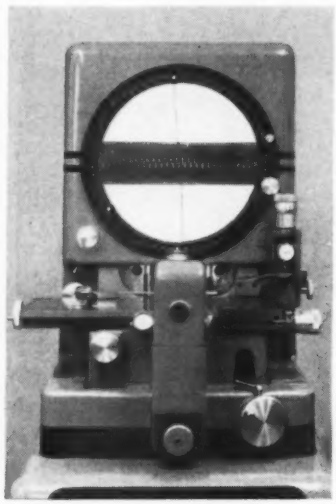
CIRCLE INFORM-A-GRAM KEY NO. 11

How many places in your plant can projection gaging save time and money?

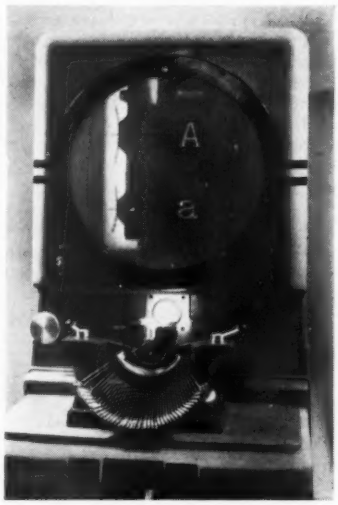


In the toolroom? Look at this. Prior to adopting projection gaging, a Midwestern manufacturing plant required 725 man-hours monthly to inspect flat drills, taps, special cutters, and circular form tools. Use of a Kodak Contour Projector reduced inspection time 84% to 115 man-hours; cost of the projector was returned in direct labor savings within three months. If you have a heavy inspection load in your toolroom, chances are that optical gaging with Kodak Contour Projectors could effect similar savings for you.

In receiving? Here's the experience of a leading maker of aircraft engines. Their gaging procedure on jet engine blades called for inspecting 11 dimensions (including radii and angles) on the dovetail contour, 14 additional dimensions on the blade root. Using two Kodak Contour Projectors, they checked these pieces at a rate of 150 per hour. And operators required little training. What about your receiving inspection department? Couldn't a fast, highly accurate method of inspecting all sorts of parts with multiple dimensions and complex shapes help prevent bottlenecks?



In production? A lot of people don't think of optical gaging in terms of production inspection. A typewriter maker did. To check the alignment of type bars to ±.0002″, they placed a Kodak Contour Projector next to the soldering jigs on which bars are mounted on their arms. Catching errors at this point and correcting the jigs reduced alignment time in final assembly 25%. Install Kodak Contour Projectors next to production equipment and you have a fast, continuing check that insures machine settings are correct. That's a good way to keep scrap costs down and quality up.



In final inspection? Ever have a part that was almost impossible to inspect accurately and completely? A leading West Coast electronics manufacturer did. They had to check the precise pitch of a fine wire helix mounted in its glass tube. "Without the Kodak Contour Projector," the company reported, "it would not be practical to make the measurements necessary to get a satisfactory instrument." Many times optical gaging on a Kodak Contour Projector lets you measure small or easily distorted parts with a simplicity and accuracy you can't achieve by other methods.

WHATEVER your inspection or measuring problem, there's a Kodak Contour Projector to do the work, from the bench-type Model 8 to the big Model 30 with its 30-inch screen and large part capacity.

To find out more about how optical gaging can save you time and money, improve accuracy, send for the booklet, "Projection Gaging with Kodak Contour Projectors." Write *Special Products Sales Division.*

EASTMAN KODAK COMPANY, Rochester 4, N. Y.

the KODAK CONTOUR PROJECTOR

Kodak
TRADE-MARK

CIRCLE INFORM-A-GRAM KEY NO. 12

. . . Month's Talk from Page 11

own company needs, are now re-evaluating their own positions. Chrysler, for example, has announced an increase in its goal from a ratio of one apprentice to every 10 journeymen to a ratio of 1 to 5. A number of others are following suit.

Using the aforementioned union survey as a basis, 40% retiring in 10 years would mean approximately 10% per year. Relating that to industry in general would mean graduating one apprentice for every 20 skilled men just to maintain the needed replacements. Considering a four-year apprenticeship, this would mean a ratio of one apprentice to every five journeymen will be needed.

Even this liberal a ratio does not make allowance for those who fail to complete their training, or for building up the present short supply of tool and die makers. No allowance is made, either, for increased needs resulting from the continually growing complexity of metal products and the Country's rapidly expanding production.

Apprentice training has been going on from time immemorial. In medieval times boys were taught through the trade guilds. More recently we think of the youth in the Blacksmith Shop or the Cobbler's Shop learning his trade, and then on to modern times in our mass production plants.

Why then is the shortage so acute at this time? Several reasons are well known: up to World War I, immigrants who had been trained abroad provided a substantial pool of skilled manpower. Since the early 1920s, when the new immigration legislation was enacted, the influx has been reduced to a mere trickle. Of course, with business in the doldrums during the 30s the need for training was not so apparent. During that time, also, we experienced a low birth rate that is being felt now in the shortage of boys within the training age limits of 18 to 28.

Dislocations during World War II resulting from Federal Draft policies and "quickie" job training were another contributing cause. Because of these problems, many companies failed to reinstitute apprenticeship programs on a large scale. Even the G.I. Bill of Rights figures in the situation, for many young men who would have become artisans were able to attend college, instead of completing apprenticeships.

Finally, the wage differential between skilled and unskilled workers has narrowed in recent years. This tends to discourage boys from accepting a four-year apprenticeship as opposed to immediate higher earnings as a production worker.

We hear so much these days about the shortage of trained engineers and scientists, especially in comparison to the way Russia is producing them. Equally important, in my opinion, is the skilled worker shortage, for who else is going to translate the dreams and designs of the engineers into actual production tools in the modern factory? Much more attention should be paid to this condition on a national basis by our industry and government leaders.

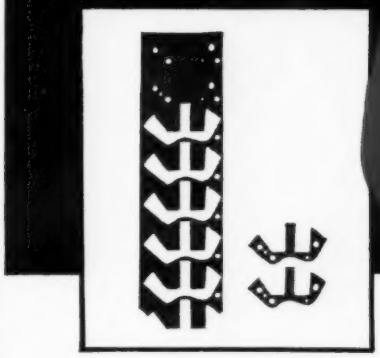
There are the facts, gentlemen, irrefutable as coming from most reliable sources. What, then, is the answer? Expansion and improvement of our apprentice training programs throughout the whole metal-working industry is the ONLY answer. But, you might fairly ask, "Is it profitable to do this sort of training?" We in NTDMA think so and, in the next few minutes, I'll try to prove why.

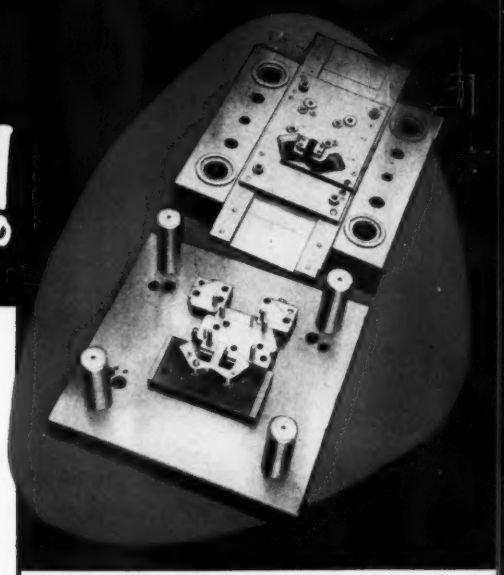
Training Saves Money

With an expanding population and a continuing demand for new products, and industry's development of more intricate, precise and automatic methods, there is an ever-growing demand for special tooling. This, in turn, requires more and more work by highly skilled men. The civilian economy as well as the defense of our nation places on us the direct,

. . . *Continued on Page 16*

Carbide Economy!





4700 MAGNETO LAMINATIONS PER HOUR! PRODUCED BY GALE PRODUCTS, DIVISION OF OUTBOARD, MARINE & MFG. CO., GALESBURG, ILL., WITH A HARIG CARBIDE DIE.

Producing laminations for outboard motors and rotary power mowers, this Harig carbide die produces an average of 2½ to 3 million parts before reconditioning is necessary. Parts must be burr free to assure alignment of stack, and tolerances held from .002 to .006 maximum. Stamping material is Silicon core plated c-2 #26 ga. .0200—.0170 steel.

This is a typical example of Harig engineering and manufacturing skill. Pioneers in the use of carbides, Harig sets industry standards for precision and quality.

Let us estimate your next special tool or die job. There is no obligation.

Headquarters for the Finest in Precision Tools!

Harig engineering skill is at your disposal whenever you need special precision tools and dies. We will be glad to send you this fully illustrated catalog showing our services and facilities.

Harig Manufacturing Corp.
5761 W. Howard St.,
Chicago 31, Ill.

CIRCLE INFORM-A-GRAM KEY NO. 13

Grinds with "PUSH-BUTTON"

the BESLY No. 240-30"

DOUBLE HORIZONTAL DISC GRINDER

- **UNHEARD OF ACCURACY**
  .0001" for parallelism
- **PUSH BUTTON CONTROLS**
  from both sides
- **SEALED QUILL MOVEMENT**
  hydraulically operated
- **FOR GRINDING**
  piston and bearing rings, automatic transmission plates and similar shapes.

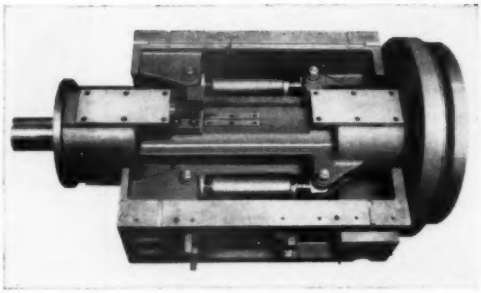
An Entirely New Idea in Grinder Design

This sleek, new, giant beauty has all spindle motors and other operating units contained within the broad, low, massive, easily accessible base . . . with push-button controls on both sides! An entirely new and improved grinder design that reduces maintenance, dressing, changes, and set-up down time . . . as much as ⅓ less!

With push-button control and at-a-glance reading of head and disc alignment . . . sealed spindle quill construction . . . automatic push-button dressing . . . automatic sizing to adjust disc wear . . . edge-grain Formica wearing ways . . . head assembly neoprene sealed against dust and coolant . . . fast through feed . . . and quick disc removal—the Besly No. 240 is the most *practical* grinder available today for high speed precision finishing of piston rings, bearing rings, automatic transmission plates and similar shapes.

Write for further information on this and other Besly machines for easier, faster, lower cost precision grinding. Better yet, ask our Besly Engineers to give you the answer to your toughest grinding problem!

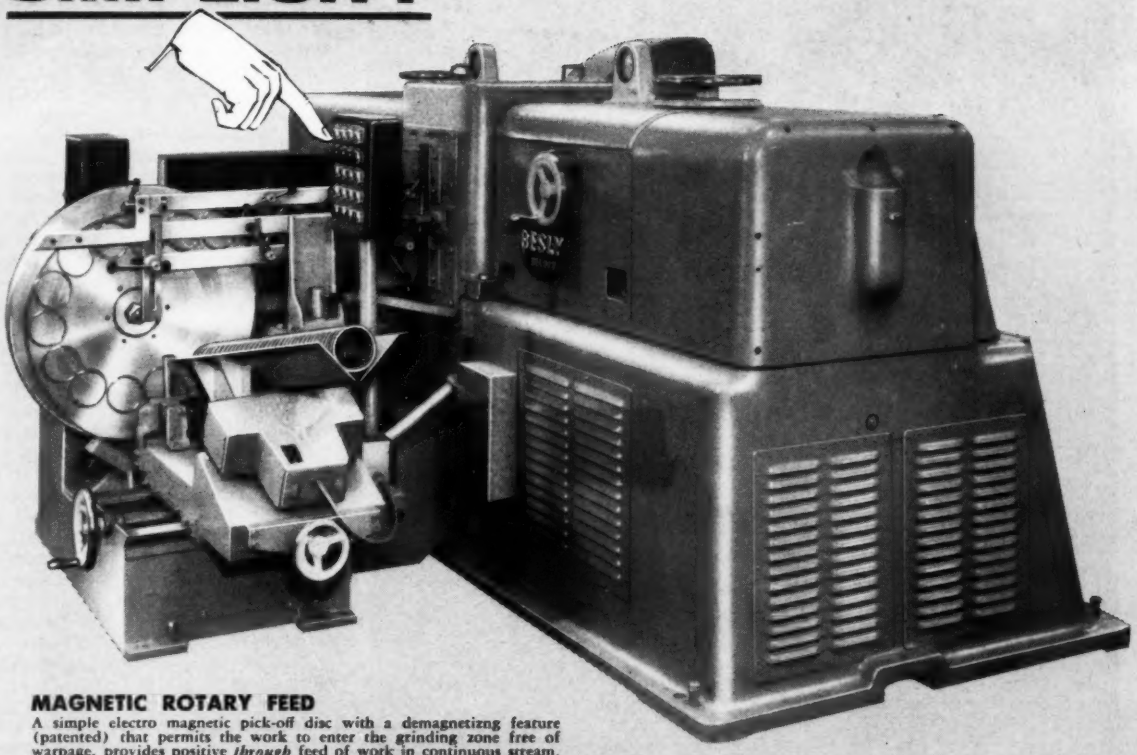
Besly Grinders and Accessories • Besly-Titan Abrasive Discs and Wheels • Besly Taps, Drills, Reamers, End Mills, Tool Bits, Carbide Blanks, Tool Holders and Throwaway Inserts • Besly-Metro Gages and Carbide Tipped Tools



SEALED SPINDLE CONSTRUCTION

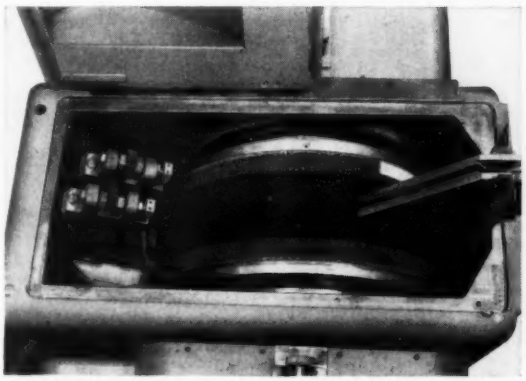
Removed from the motor and other mechanisms for vibration-free performance, the spindle sleeves are cradled in the head. They are moved in and out by a pair of hydraulic cylinders (visible above), sliding on six flat ways. These ways, edge grain Formica against steel, are grouped radially around sleeves, three in front, three in back. Upper way wear plates adjust up and down to provide take-up for wear. Spindle movement, 4½" max., is actuated by push button operated solenoid valves. Micro screws, operated by finely graduated handwheels, limit the movement toward and away from the work. Quick, perfect head and disc alignment sideways is made possible through head aligning device which provides at-a-glance readings in .005" graduations. The basic triangular shaped quill design used here is the same improved grinder feature introduced by Besly many years ago. It has definitely eliminated the problems of wear and inaccuracy commonly found in old-fashioned way construction.

SIMPLICITY



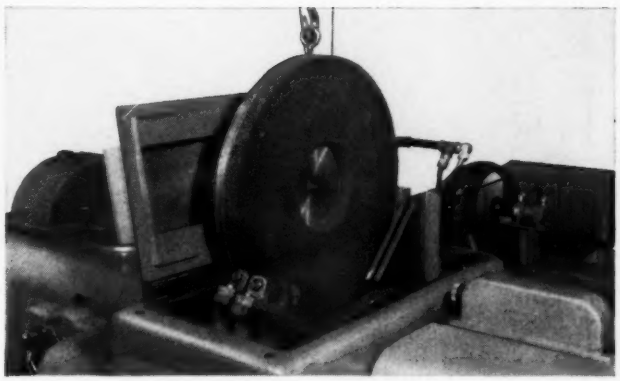
MAGNETIC ROTARY FEED

A simple electro magnetic pick-off disc with a demagnetizng feature (patented) that permits the work to enter the grinding zone free of warpage, provides positive *through* feed of work in continuous stream. This mechanism is quickly and easily adjusted for various parts diameters. Other feed mechanisms can be designed to accommodate shapes similar to piston rings, bearing rings and automatic transmission plates.



AUTOMATIC PUSH-BUTTON DISC DRESSING

Push-button actuated, hydraulically operated swinging arm abrasive dressers are provided. Mounted on the head they are always in alignment with the center line of the spindle. This assures perfectly flat discs regardless of the position of the head. This unique feature cuts dressing downtime to new lows.



EASY, QUICK DISC REMOVAL

Hood is made with a large, hinged opening to facilitate the replacement of worn abrasives. The 30" abrasive discs are removed by hoisting straight up without disturbing guide bars. Downtime due to abrasive changing is substantially reduced by this improved design feature.

BESLY

BESLY-WELLES CORPORATION

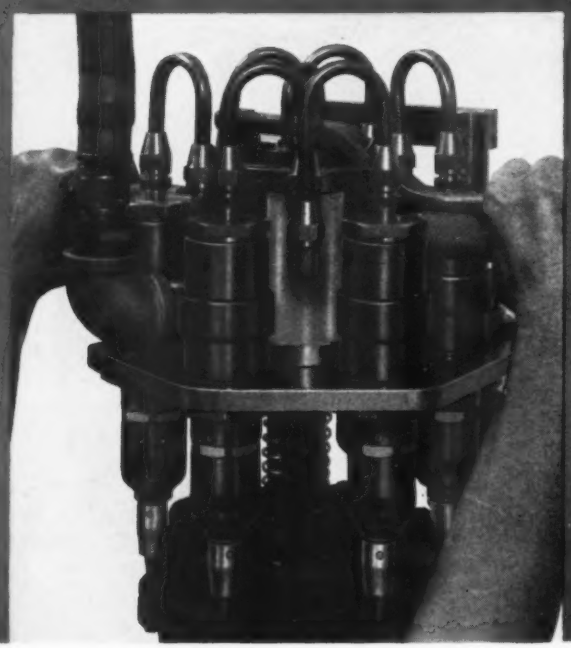
Est. as C. H. Besly & Co., 1875

128 DEARBORN AVENUE • SO. BELOIT, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 15

he HAD to use a hand wrench!

but YOU can use a Buckeye Air Tool!



Why AIR Tools?

Because air is everywhere, just waiting to be put to work . . . because continuous operation can't possibly harm an air tool . . . and because, if you're using Buckeye air tools, you can almost forget about tool maintenance.

This Buckeye Tools multiple-unit fastening tool runs down six hex head bolts simultaneously. It could be designed to handle more bolts, different sizes of bolts, or to run them down at different levels at the same time. Or, it could run down bolts at various angles, even straight up!

This is just one of many new Buckeye fastening tools. Are you sure you're doing your fastening work the modern way? Our Catalog A-10 will help you decide—and it's yours for the asking.

In Air Tools, Your Best Buy Is Buckeye

Buckeye Tools CORPORATION

DIVISION 19 • DAYTON 1, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 16

. . . Month's Talk from Page 13

moral responsibility of a proper and adequate training program.

Employers generally have said that after two years' training, an apprentice is more than able to earn his pay and is an asset to his company. Most agree, moreover, that the men trained by a shop turn out to be their best and most loyal employees. They prove to be the best source of foremen and supervisors in later years — a point well worth remembering!

Often you hear remarks about the high rates of pay in our industry. The highest paid men, however, are not causing you trouble. You're glad to pay high wages for top performance. It's a different story with the mediocre employee riding on the coat-tails of the top men — one getting fifty cents an hour less, who makes mistakes and is the real drain on your profits. Training helps alleviate, or at least minimize, this condition by giving a better ratio of top-flight men and lowering production costs. Likewise, quality workmanship builds a reputation and enhances a company's position with an enlarged group of satisfied customers.

Such training, though somewhat on the intangible side, can be considered as part of your contribution to the national security. Maximum production in an emergency can only be assured by a full quota of skilled craftsmen.

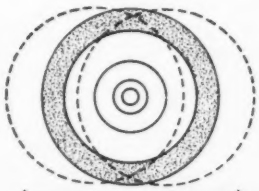
To look at a different aspect we might ask ourselves a few questions: What will be the cost of tools five to 10 years from now if nobody trains apprentices? How much per hour will we have to pay for what men are left in the business?

Here is a typical example of what might happen if training were stopped — an actual case history of a shop of 42 men over a 10-year period showed that 24 (or 56%) were still with the company and 18 (or 44%) had left. The reasons for leaving were: two moved away; two died; six were machine men hired during the war who had left for various reasons; three because of sickness and old age; and five went into business for themselves (though only two in tool and die shops).

That alone should be proof of the essential need for apprentice training. Losing 45% of your employees in 10 years is a startling fact, though you'll recall it agrees closely with the union survey previously mentioned. We can all say "let the other fellow do it; I'll find the manpower when I need it." Adequate training would eliminate the need for labor pirating in periods of stress, however.

I think we can agree on the profitability of such training to the employer. But, what about the employee? He too must be sold on the benefits. Granted the pay scale for the first year or so may be under what he can earn elsewhere. He is

. . . Continued on Page 18



ADJUSTABLE FOR OSCILLATING FREQUENCY AND LENGTH OF STROKE

IT OSCILLATES!

SPECIALLY DESIGNED FOR USE WITH
NEW ANOCUT ELECTROLYTIC GRINDING PROCESS
- CUTS DIAMOND WHEEL COSTS
- GRINDS FASTER
- SOON PAYS FOR ITSELF

NEW *Hammond* ELECTROLYTIC OSCILLATING CARBIDE TOOL GRINDER

Write FOR CATALOG

The *New* Hammond Oscillating Carbide Tool Grinder was designed primarily for use with the Anocut Electrolytic Grinding Process. It can also be used for conventional grinding without the Electrolytic "Power Pack".

A controlled and precise method, the Electrolytic process removes stock electro-chemically. It is *not* to be confused with electro-spark or electro-arc methods. It reduces diamond wheel consumption 80 to 90%.

Outstanding feature is the precision, dynamically balanced, OSCILLATING spindle... with *variable* oscillations per minute and *variable* length of stroke. The operator no longer oscillates the tool . . . the wheel does the work, with greater speed, smoothness, accuracy, and less physical effort.

Hammond OF KALAMAZOO "Good Machinery Since '82"

Hammond Machinery Builders INC.

1631 DOUGLAS AVE. • KALAMAZOO, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 17

Lepel

HIGH FREQUENCY *Induction* HEATING UNITS

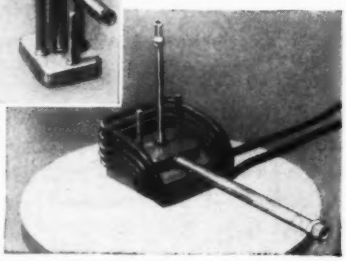
BRAZING
HARDENING
BOMBARDING
SOLDERING
ANNEALING
MELTING

The Lepel line of induction heating units represents the most advanced thought in the field of electronics as well as the most practical and efficient source of heat yet developed for industrial heating. With a background of half a century of electrical and metallurgical experience, the name Lepel has become the symbol for quality in induction heating equipment embodying the highest standards of engineering achievement, dependable low cost operation and safety.

If you are interested in the application of induction heating you are invited to send samples of the work with specifications of the operations to be performed. Our engineers will process these samples and return the completed job with full data and recommendations without any cost or obligation.

TYPICAL INDUCTION HEATING APPLICATIONS

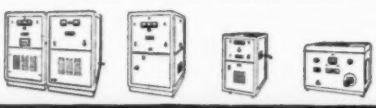
A Lepel installation at Federal Telephone and Radio Co. shown soldering transformer terminals. A precision operation made so simple that even unskilled operators can achieve excellent results on a production basis.



The simultaneous soldering of a group of components within one load coil is an ideal application for induction heating. The assemblies consist of mounting studs and tubes inserted into a machined part together with preformed solder rings. The heating is done so rapidly that there is practically no scaling or discoloration.

Electronic Tube Generators—1 KW; 2½KW; 5 KW; 10 KW; 20 KW; 30 KW; 50 KW; 75 KW; 100 KW.
Spark Gap Converters 2 KW; 4 KW; 7½ KW; 15 KW; 30 KW.

WRITE FOR THE NEW LEPEL CATALOG . . . 36 illustrated pages packed with valuable information.



All Lepel equipment is certified to comply with the requirements of the Federal Communications Commission.

LEPEL HIGH FREQUENCY LABORATORIES, INC.
55th STREET and 37th AVENUE, WOODSIDE 77, NEW YORK CITY, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 18

. . . Month's Talk from Page 16

learning a trade, however, and being paid for doing so. His opportunity is equivalent in many respects to a college education, but he doesn't have to pay for it. Even in periods of slow business, the good tool and die makers never walk the streets — they have exceptionally high job security.

To sum it all up, you can't afford not to train if you intend to stay in business!

Careful Selection a Must

Once you have agreed that there is a real need and that it is profitable to train, the next logical area of consideration is the selection and training of apprentices.

Though you might be fortunate in finding suitable young men easily, careful selection is important. Boys between the ages of 18 and 28, graduated from high school or trade school, with above average intelligence prove to be the best apprentices. A desirable method of screening applicants is to make use of local agencies who specialize in aptitude and ability testing. Often your State Employment Office will cooperate by referring qualified boys and performing the necessary tests for you. If outside sources are not available, it is a relatively simple matter to develop your own interviewing and testing techniques. Finding out the boy's hobbies and interests can give clues to his adaptability to such training. Testing with a micrometer (have him handle one and make a few sample readings) or simple mathematical problems, is effective.

Once the applicant has completed successfully the interview and passed the aptitude test, it is well to have a discussion about his future with his parents. Only after all are satisfied should the formal application be signed. Even then it is possible that your careful selection technique can fail occasionally, so it is common practice in the indenture agreement to include a three to six-months' probationary period. During this time, observe how he accepts the new routine and fits in with others in performing his assignments. If all goes well, you have a good apprentice.

Obviously, no specific training program will serve with equal success in every shop, but certain basic standards and training precepts will serve as the foundation for the individual shop's training program.

Some one person must be designated to supervise the training. Where only one or two apprentices are involved, the shop owner himself may be the person. Where 15 to 20 boys are in the program, a more formal supervision, control and checking procedure, under the responsibility of a key man, is important.

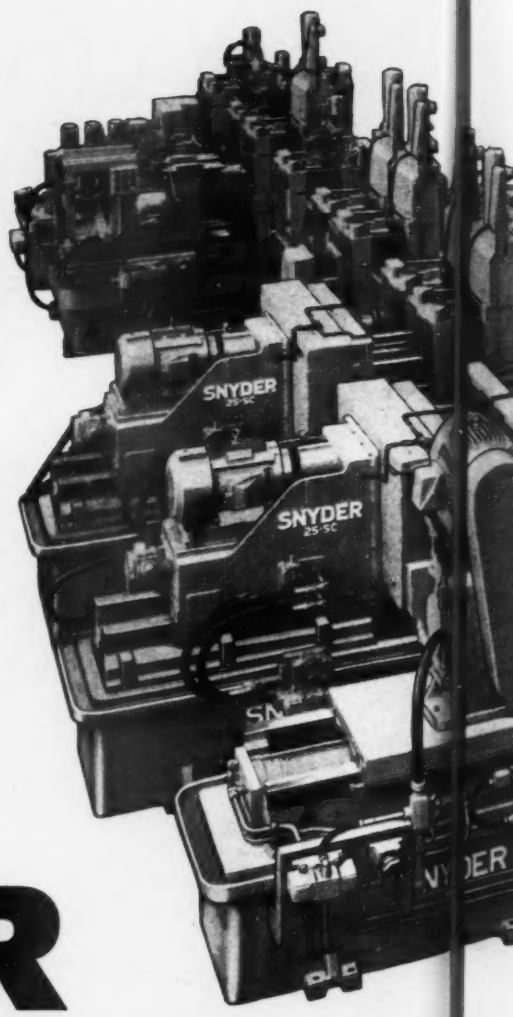
. . . *Continued on Page 23*

FALCON
KWIKLOK
QUICK CHANGE HOLDERS
with T. I. DRIVE
PAT NO 2 612 377
Decidedly New!
OUR—ADAPTERS—Will take SHELL END MILLS, BROWN & SHARPE And MORSE TAPERED SHANK STANDARD DRILLS & REAMERS, STRAIGHT SHANK END MILLS, JACOBS CHUCKS, FLYNN OFFSET BORING HEADS, FALCON T.I. DRIVE STANDARD INTERCHAIN GEABLE COUNTERBORES, SOLID BORING BARS, FLOATING TAP HOLDERS & ETC.
you have waited for...
—YOU—Can have our latest Brochure just for the asking. It will give you all the PERTINENT ENGINEERING DATA You will want.
WRITE FOR YOUR COPY TODAY
—FALCON—
WIKLOK-HOLDERS
re the quickest of the quick.
ade with NATIONAL STANDARD
APERS, BROWN & SHARPE, MORSE
ETC.
Just what
FALCON
Mailing Address: P. O. Box 4605
Mt. Elliott Station, Detroit 34, Mich.
END MILLS • FORM RELIEVED CUTTERS • REAMERS • MILLING CUTTERS SPECIAL TOOLS • MULTIPLE DIAMETER STEPCUTTERS • T. I. DRIVES ON ALL TYPES OF SHANK TOOLS • COUNTERBORES • KWIKLOK QUICK CHANGE TOOL HOLDERS, ADAPTERS AND ETC.

UNIQUE FEATURES IN SNYDER 9-SEGMENT, 24-STATION, IN-LINE AUTOMATED TRANSFER MACHINE

for processing converter housings; independent control panels permit individual segment operation (co-ordinated with master panel); electric circuits can be individually checked by Circuit-Sleuth Panel; at Station 4, workpiece is re-oriented 90°; at Station 21, two dowel holes and one transmission hole are precision bored to .001 in size; at Station 22 these holes are automatically precision air gaged.

Workpiece reaches machine finish ground on both faces; machine performs 59 operations, delivers workpiece completed and automatically inspected. Production, 128 pieces an hour at 100% efficiency.

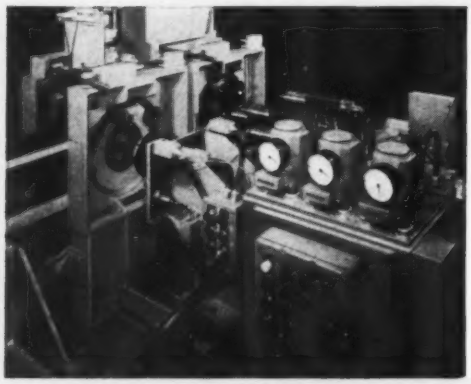


SNYDER

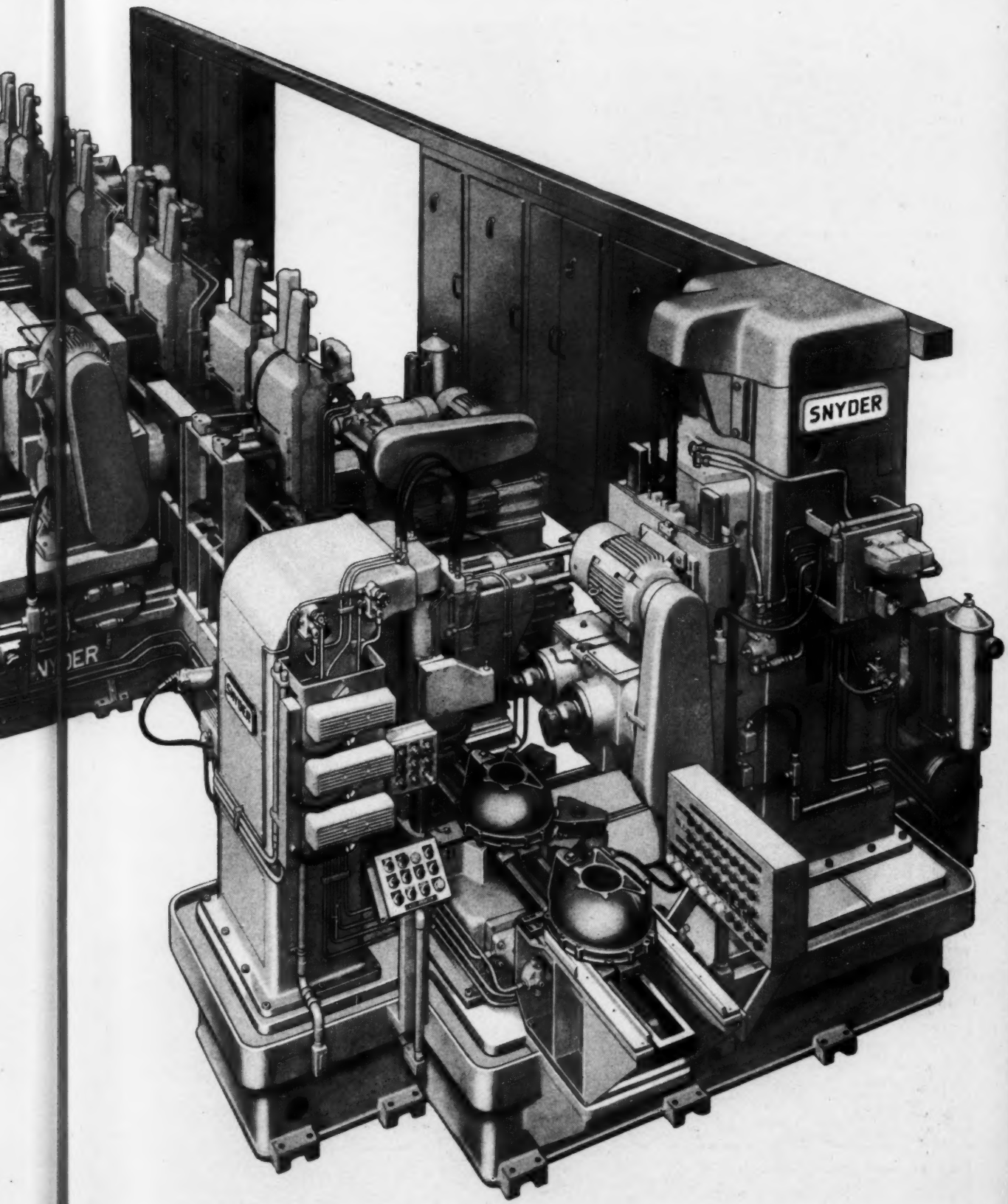
TOOL & ENGINEERING COMPANY

3400 E. LAFAYETTE • DETROIT 7, MICHIGAN

31 Years of Special Machine Tools with Automation

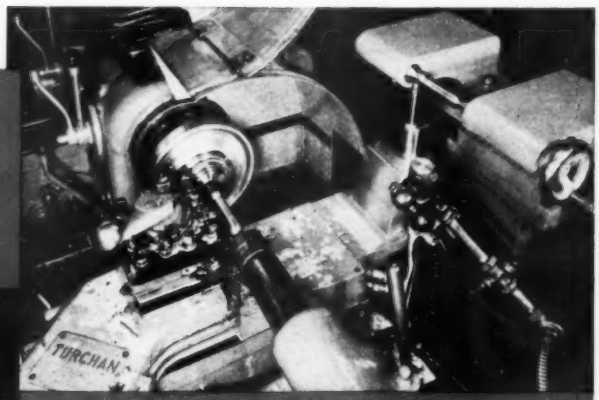


Boring and air gaging stations.


SNYDER

Turchan HYDRAULIC TRACER CONTROLS

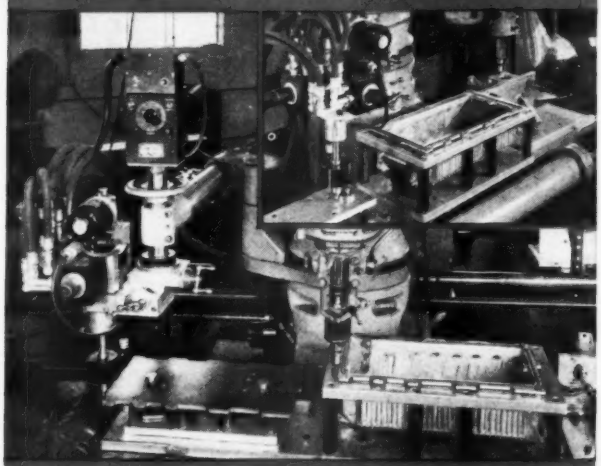
THE SIMPLEST SYSTEM OF MORE PROFITABLE PRODUCTION



Turchan tracers assure a finer finish. The smooth, continuous advance of the carriage by power feed, coupled with the floating action of the angular tool slide, produces a turned surface of unsurpassed smoothness. In many instances final grinding is unnecessary.

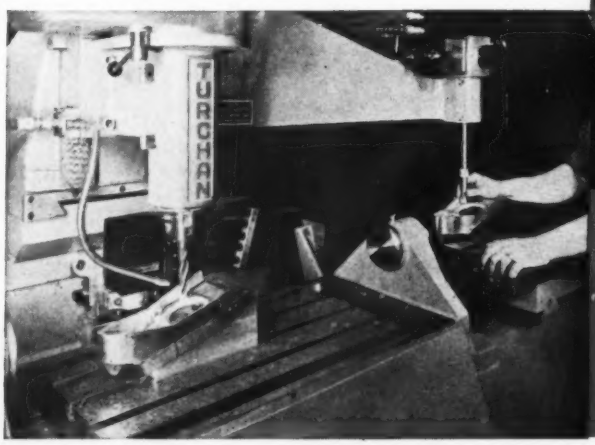
TURNING
MILLING
BORING
PLANING
SHAPING

Machine tools equipped with Turchan tracer controls handle a greater variety of work faster and more accurately. Standard operation of the machine is possible by a simple switching mechanism which converts the machine quickly from straight work to intricate profiling and contouring and back again.



Complicated work requiring contouring, grooving and profiling are handled easily with Turchan Tracer control. In most cases many extra operations are reduced to one set-up.

TURCHAN
FOLLOWER MACHINE CO.
8259 LIVERNOIS • DETROIT 4, MICH.



Turchan units are supplied complete. Installation is very simple and all installations are supervised by a Turchan engineer.

Write today for your Turchan Folders. If you have a production problem Turchan has the solution.

. . . Month's Talk from Page 18

The better your training plan is organized and executed, the better journeymen will result. You get back in direct proportion to what you put in. The usual period of training to become a qualified tool and die journeyman is 8,000 hrs, with credit being allowed for previous experience in the trade. The hours of work and conditions regarding overtime, vacations and fringe benefits should be the same as for journeymen.

The supervisor of apprentices, or whoever is responsible for their training, must see that they are moved on a predetermined schedule from department to department. Never during the training should they be allowed to become bored with the work. Rather, they should continually be looking forward to new challenges.

A careful record of the apprentice's progress should be maintained in writing. Periodic reports should be made and the boy's parents should be kept informed as to how he is coming along.

A basic work training schedule might be as follows:

Tool Crib	200 hrs
Shaper	600 hrs
Drill Press	500 hrs
Milling Machines	900 hrs
Lathes	1000 hrs
Grinders	1400 hrs
Filing Machines	200 hrs
Contour Cutting	100 hrs
Heat Treating	100 hrs
Bench Work	3000 hrs
Miscellaneous Machines	
Total	8000 hrs

Essential to all apprentice training programs is outside related training in some approved school. A minimum of 144 hrs is required per year, though usually it amounts to 160 to 168 hrs in most programs. Often, related training classes are held during working hours and the apprentice is paid while in school. The course and the text material are paid for by the employer or the state. In some sections of the country, it is customary to arrange for apprentices to take related training at evening school.

Related training might consist of the following:

Mathematics, including algebra, geometry, trigonometry and trade calculations	250 hrs
Blueprint reading and sketching	140 hrs
Related technical and trade material: heat treatment, strength, of material, gearing, etc.	200 hrs
Social and industrial relations, basic economics	40 hrs
Safety	10 hrs
4-year Total	640 hrs

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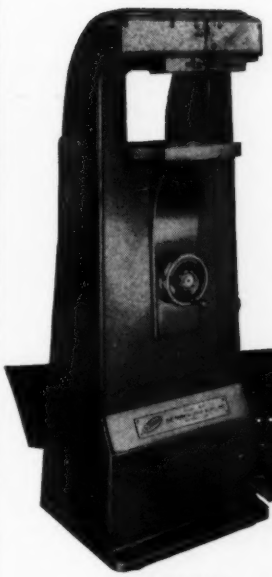


PRECISION...
UNIFORMITY...
FLEXIBILITY...

Mark 1000 or more units per hour on an infinite variety of surfaces, flat, round or curved—with absolute uniformity of depth of impression throughout longest production runs.

...PARKER #710 makes marking a production line operation

TYPICAL CASE HISTORIES

MARKING SPOONS

Using Parker #100 "standard" insert roll die holder and interchangeable segment type. The machine table's "cushioning" effect, plus proper set-up, compensated for the curvature of the spoon.

CAPACITOR SHELLS

800-1000 marked pieces per hour on thin walled aluminum shells with Parker tooling, custom built for use on the Parker #710.

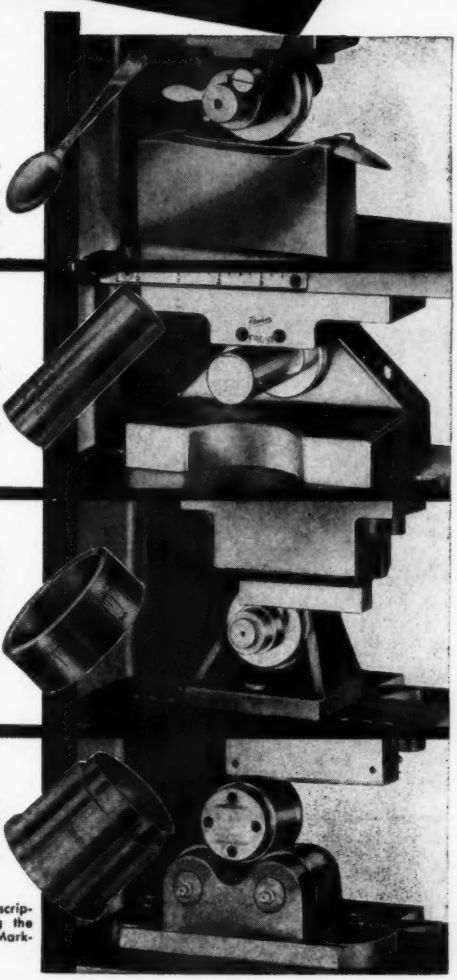
GRADUATED COLLARS

Using a standard Parker stud arbor, the precision graduations were easily indented in this steel collar. Depth of mark was close ly held to specified tolerances.

SOLID ROUNDS

Marking part numbers and other legends on the outer diameter of solid rounds is no problem. Standard Parker roller bearing cradles are used on this production run.

SEND TODAY for new descriptive literature describing the Parker #710 Hydraulic Marking Machine.



THE PARKER-HARTFORD CORPORATION
MARKING DIE & MACHINERY DIV.
FRANKLIN AVENUE • HARTFORD, CONNECTICUT

by Parker

CIRCLE INFORM-A-GRAM KEY NO. 23

V-B Liquid Honing*

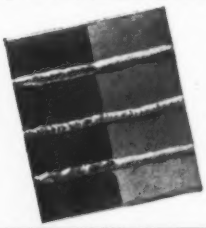
Your Way to Say:

"MOST MODERN PRODUCTION BLASTING EVER DEVELOPED!"

This Machine Should be Processing Your Parts

Vapor Blast Liquid Honing removes heat treat scale faster than conventional tumbling or any other process, and without pitting the steel.

Vapor Blast Liquid Honing blends out grind lines, as shown in the area to the left. The smooth, non-directional surface is ideal for oil flow and unequalled lubrication. Liquid-abrasive action also hones down tiny burrs along the edges of parts like this one.



This unretouched photo of three weld seams shows how efficiently you can remove mill scale, rust, welding and heat discolorations. Top weld is stainless steel; next, copper brazing; bottom, common steel.

For surface conditioning or finishing, a switch to Liquid Honing will save you a superintendent's pay in a year or less. Metals, plastics, ceramics — any material you use — can be Liquid Honed fast and to close tolerance. You get a better production job every time . . . at lower cost and without usual danger to the operator.

Send a sample scale-covered part with a letter describing your problem. Liquid Honing engineers will remove the scale and return the part with their recommendations. No cost to you . . . no obligation.

VAPOR V-B BLAST
MILWAUKEE, WISCONSIN

*Liquid Honing and Vapor Blast are trademarks.

DOLLAR FOR DOLLAR, JOB FOR JOB, NO OTHER SURFACE-CONDITIONING METHOD CAN EQUAL LIQUID HONING

VAPOR BLAST MFG. CO.

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KWIK-CHEK gages adjust instantly to any diameter reading from .025" to .380" . . . accurate to .0005" . . . and lock at *precise* diameter readings.

KWIK-CHEK gages (priced at $40 each, or $115 for the set), are used by tool engineers, machinists, and inspectors. Crystal reading magnifier and easy adjustment—5 seconds or less per reading—make them ideal for use by non-technical workers, too.

Write for name of Kwik-Chek sales agent nearest to you

HAMILTON WATCH COMPANY • ALLIED PRODUCTS DIVISION, LANCASTER, PENNA.

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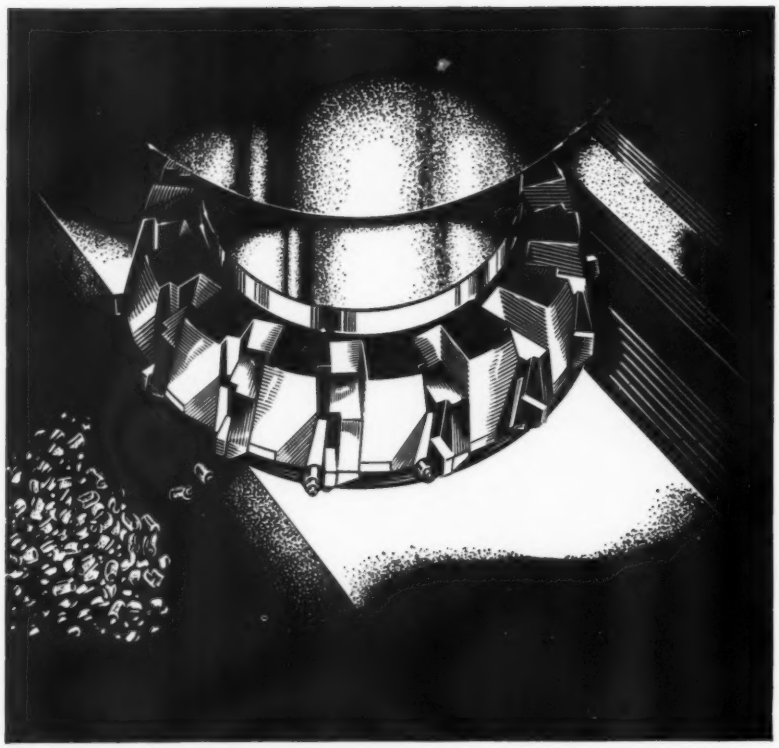

"MISTREATED MASS PRODUCTION MANIAC"

That's the inserted blade carbide tipped milling cutter. Here's a tool that really outperforms ordinary milling cutters when it's used right. It makes possible increased production with more pieces per grind and better finishes at lower cost.

Economical milling with carbides requires careful tool engineering. This has been recognized for many years at Go & Go. Failure to do so has soured many a carbide application.

Go & Go produces a complete line of inserted blade carbide milling cutters including tools designed for specific jobs (specials). We think they're the finest you can buy because sound engineering comes with these cutters. If your application isn't right for them, we'll tell you so. And we'll tell you how to make it right.

For specifications on a really complete line of inserted blade carbide milling cutters, ask for Catalog "F". Or better still, consult the Go & Go engineering sales representative in your area.

Go & Go

GODDARD & GODDARD COMPANY
DETROIT 23, MICHIGAN
Engineering and producing tools that Go & Go since 1917.

CIRCLE INFORM-A-GRAM KEY NO. 26

. . . Month's Talk from Page 23

The NTDMA Apprenticeship and Training Manual Committees are collaborating to prepare a series of books on related training for apprentices — the first of their kind ever published for tool and die maker training.

As would be expected, the Basic Training Schedule and the Related Training Program vary from shop to shop, depending on the work or specialty that it emphasizes. In the automotive industry, Ford Motor Co., for example, recommends more bench time and a lesser proportion of time on some types of machines. The same applies to outside studies. A little difference in the schedule does no harm as long as the basic components are covered adequately.

It is well to find out what your state apprenticeship requirements are and plan to register your shop's training program. An inquiry directed to the State Department of Labor or Secretary of State will bring the desired information.

It is advisable to register with your State Apprenticeship Council, or, if none exists, the Bureau of Apprenticeship-U. S. Department of Labor. The National Tool & Die Manufacturers Association recently received certification of their recommended standards. A letter to the NTDMA office in Cleveland will bring complete details on apprentice training in a brochure developed by our Committee.

Setting Up the Program

Lately the trade unions have begun to take a more enlightened attitude toward apprentice training. In setting up a program in a union shop, it is common practice to have a joint Apprenticeship Committee to cooperate in working out the terms and standards of the program. For many years in the Detroit area, the union insisted on a 15 to 1 ratio of journeymen to apprentices; many contracts today contain a provision for better ratios of 10 to 1, 8 to 1 and even now down to 5 to 1.

Thus far nothing has been said about wage rates for apprentices. Accepted practice is a starting rate equal to 50% of the journeymen's rate. Some of the large companies exceed the 50% and approach 66% as the hiring rate. Usually a pay scale ascending with periodic increases over the four years of training at three- to six-months intervals is satisfactory. They should be given the benefit of any general increases put into effect in the shop.

Upon completion of their training, the apprentices should receive a certificate indicating satisfactory accomplishment according to the standards contained in the agreement. These are available from the registration authority — Federal or State — or from the NTDMA, upon proper certification from the shop or committee. . . . *Continued on Page 36*

It's the *steel* in ACE drill bushings!

TWO YEAR SECRET *STEEL* FORMULA ASSURES LONGER DRILL BUSHING LIFE...

If you are one of the many ACE drill bushing users who have told us about the *extra-long bushing life* you have been getting from our drill bushings — *we thank you*... and *now* we are going to tell you why!

More than *two years ago* ACE, without telling anyone and without raising costs, began making shipments of drill bushings made of a special high-carbon chromium bearing steel! With this new oil-hardening steel coupled with an exceptionally high degree of precision in the heat treating process, ACE engineers found that bushing life was increased tremendously. Rather than make an announcement at that time... we hoped that user comments would prove the importance of the new steel —and they certainly have! From all parts of the nation ACE drill bushing users have told us about the much longer life they have been getting... how production costs from both a material and labor standpoint have dropped sharply. Now... the secret is out... it's the steel!

Look to ACE for Quality... Accuracy... Largest Deliverable Stocks Anywhere!

Write TODAY *for the all-new catalog containing technical data, comparison tables, price lists and name of dealer in your area.*

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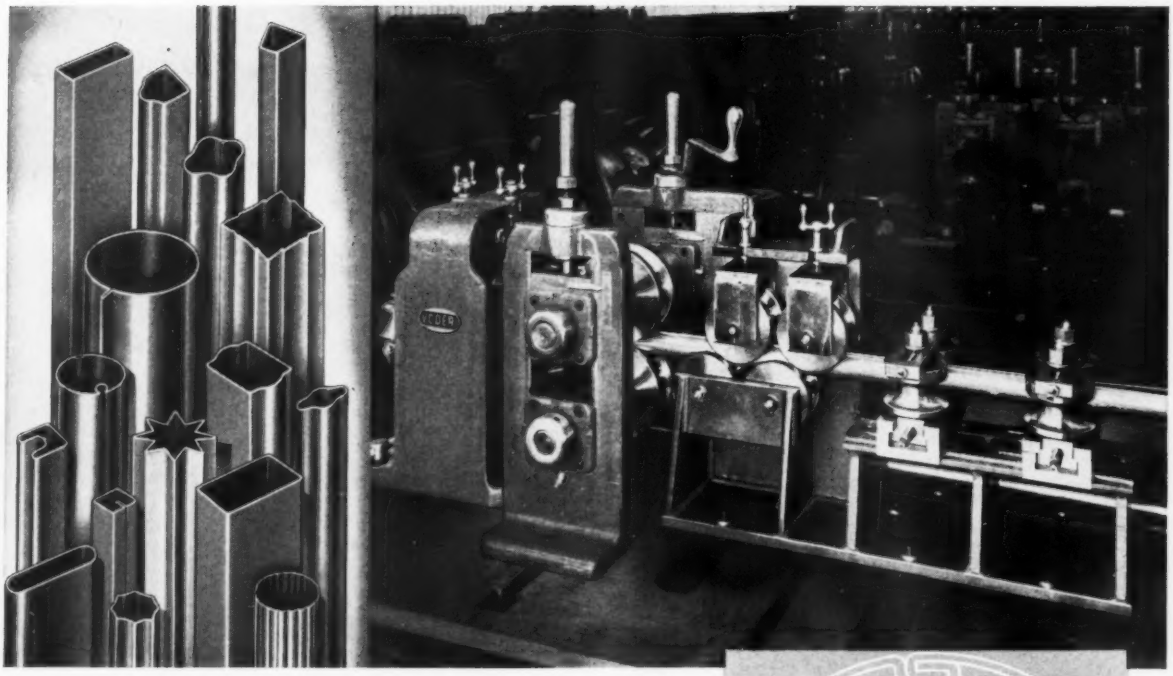


Lock-Seaming attachment at exit end of forming machine.

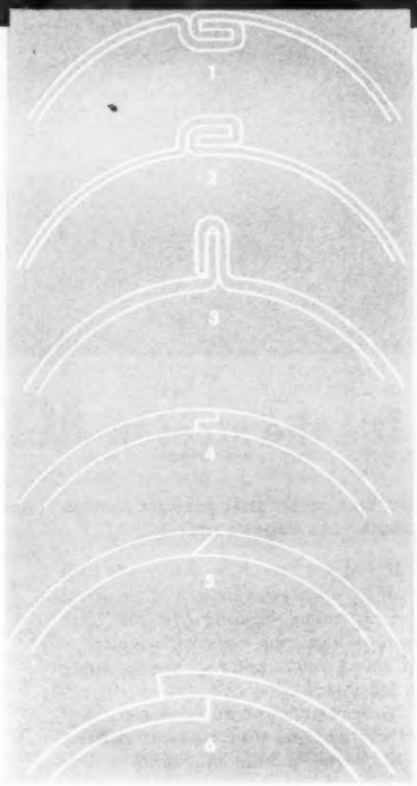
COLD ROLL FORMING TUBULAR SHAPES

Among the wide variety of things you can make on a Yoder Cold Roll Forming machine are round, square, oval, rectangular and other tubular shapes, such as illustrated at left above. The seams may be open, lapped, butted, dovetailed, interlocking, etc.—as indicated in Figures 1 to 6 at the right.

Millions of feet of such unwelded tubular shapes are made from coiled strip for conductor pipe, bedsteads, lamp stands, window channel, wiring raceways, carrying rods, etc. Production ranges from 20,000 to 50,000 feet per day, with only one operator and a helper.

Yoder offers you the cooperation of their engineering staff for designing and adapting their cold roll forming machines, auxiliaries, and tooling, for the low cost production of structurals, mouldings and trim, panels, tubular and other shapes, to meet individual needs.

The Yoder book on Cold Roll Forming is a complete, illustrated text on the art and the equipment needed for performing a variety of operations which can be combined with cold roll forming, at little or no extra labor cost. A copy is yours for the asking.



THE YODER COMPANY
5501 Walworth Avenue **Cleveland 2, Ohio**

ENGINEERING YODER MANUFACTURING

COLD ROLL FORMING MACHINES
ROTARY SLITTING LINES
PIPE AND TUBE MILLS—Electric Weld

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- Save space, weight and investment cost by replacing pump installations in many applications
- Less costly to install, operate and maintain
- **Hold pressure indefinitely** without the motion and heat generation of ordinary pump circuits
- Provide — at point of cylinder thrust — more efficient power with less weight in less space than direct driven air cylinders
- Save up to 95% of air consumed by direct driven air cylinders
- Operate at speeds of 30 to 450 strokes per minute

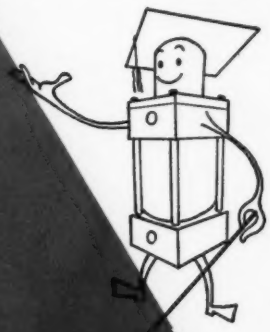
NOTE: In addition to its most complete line of "Custom-Built" Boosters available on normal delivery, Miller offers 5" bore 25 to 1 ratio boosters for immediate delivery in either 6" or 12" stroke. Write for data and prices.

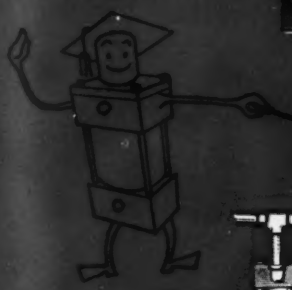
BOOST 80 PSI AIR

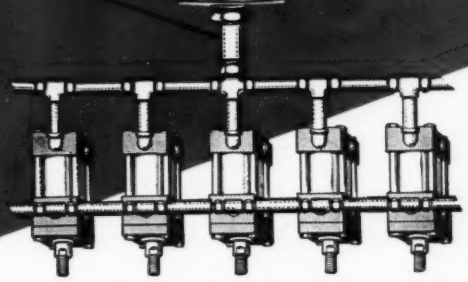
Input Range: 40 to 3000 psi Air or Fluid

TO 2000 PSI HYDRAULIC PRESSURE

Output Range: 200 to 10,000 psi Fluid







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and similar applications

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FIXTURE CLAMPS
LEAF JIGS

Only WESPO can furnish All the following work-holding devices

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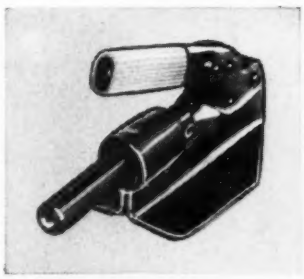

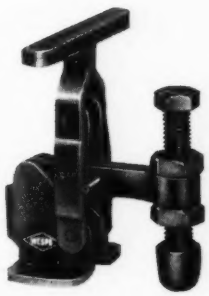

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Over 39 STYLES and SIZES . . .

NOTE THESE FEATURES:

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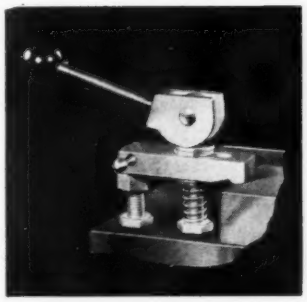
3. High tensile strength rivets—for longer service.



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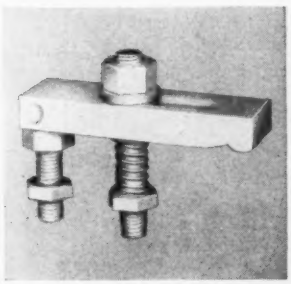
16 STYLES
159 SIZES

There is a WESPO Clamp Assembly to suit every job.



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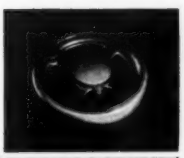

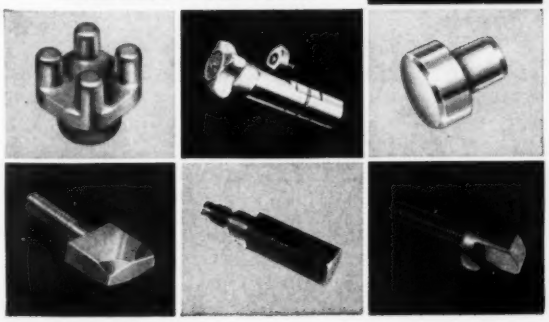

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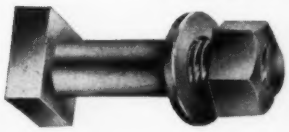
Save 50% Designing Time and Toolmakers Cost.
23 Sizes, 1½" x 2" to 6" x 6".



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Made to J.I.C. Press Room Standards.

WEST POINT MFG. CO.

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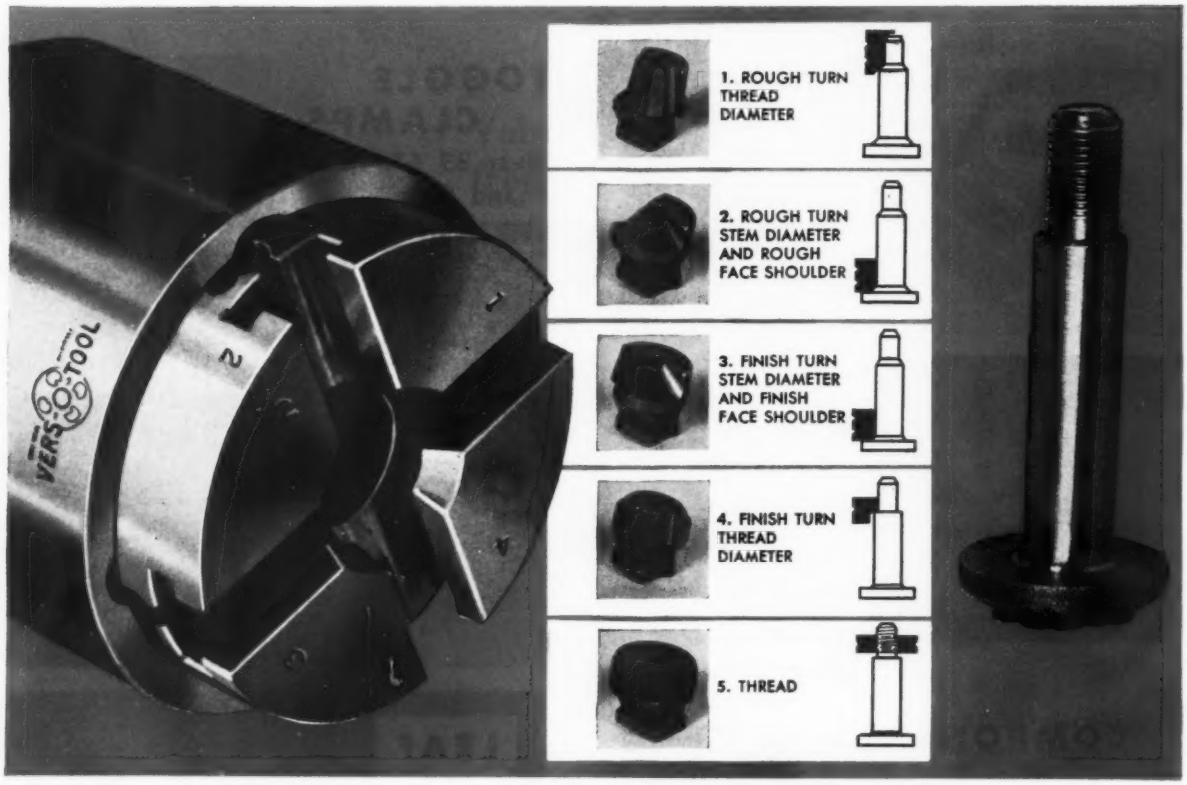
CIRCLE INFORM-A-GRAM KEY NO. 31

HERE'S HOW NAMCO VERS-O-TOOL

CUTS COSTS... SPEEDS PRODUCTION ON END TURNING AND FORMING

In this application 300 lever supports an hour are turned out on a vertical six-spindle automatic. Vers-O-Tool machines these steel forgings three times faster than single point tools, opens at the end of the cut, leaves no spiral marks on the work.


VERS-O-TOOL
1
2
1. ROUGH TURN THREAD DIAMETER
2. ROUGH TURN STEM DIAMETER AND ROUGH FACE SHOULDER
3. FINISH TURN STEM DIAMETER AND FINISH FACE SHOULDER
4. FINISH TURN THREAD DIAMETER
5. THREAD

Vers-O-Tool licks tough production problems because:

1 Basic Vers-O-Tool design permits cutters or ground thread chasers to be changed quickly without adjustment in the head.

2 All settings in the blocks are made in the tool-room with a micrometer gauge—no need for trial and error run after changing or grinding.

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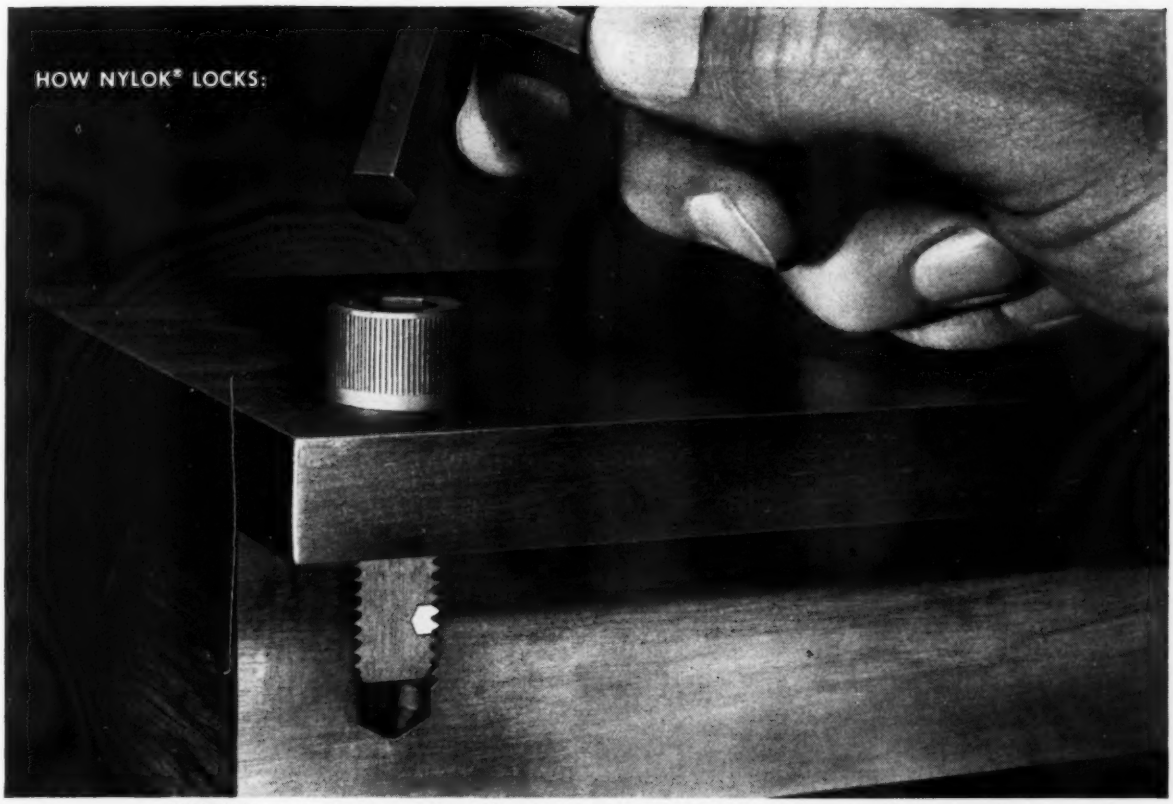

LOCKED! The tough, resilient nylon pellet keys itself into the mating threads. It forces threads together, and locks the screw securely.

NEW—a complete line of self-locking UNBRAKO socket screw products that won't work loose

They simplify design and save production time

UNBRAKO socket screws are now available embodying the Nylok* self-locking principle. Nylok provides a truly practical new solution to the problem of making screws self-locking.

You save production time when you build products with self-locking UNBRAKOS. And you get greater simplicity in design with less bulk and weight. The number of parts you must assemble to achieve full locking action is reduced to the absolute minimum. Lockwashers under screw heads are no longer necessary. Costly wiring of cross drilled heads is eliminated. So are cotter pins and complex multiple set screw installations.

Self-Locking UNBRAKOS are completely reusable. They have uniform locking and installation torques—with no galling or seizing on mating threads. They successfully withstand temperatures from —70° to 250°F. And, on properly seated screws, the pellet acts as a liquid seal.

Self-locking UNBRAKO socket screws come in a complete range of standard sizes and materials. See your authorized industrial distributor. Technical data and specifications are detailed in Bulletin 2193. Write us for your copy today. Unbrako Socket Screw Division, STANDARD PRESSED STEEL CO., Jenkintown 36, Pa.

T.M. Reg. U.S. Pat. Off., The Nylok Corporation

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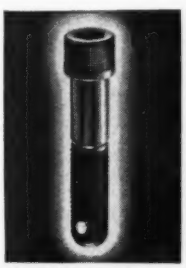
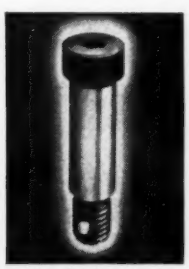
STANDARD PRESSED STEEL CO.

SPS

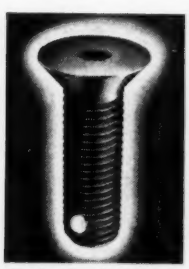
JENKINTOWN PENNSYLVANIA



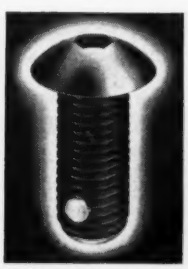
Socket head cap screws. Standard sizes #6 to 1 in.



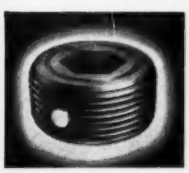
Socket shoulder screws. Standard sizes ¼ to ¾ in.



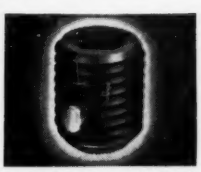
Flat head socket screws. Standard sizes #6 to ¾ in.



Button head socket screws. #6 to ⅜ in.



Socket pressure plugs. Standard sizes ⅛ to 1¼ in.



Socket set screws. All standard point types. #6 to 1 in.

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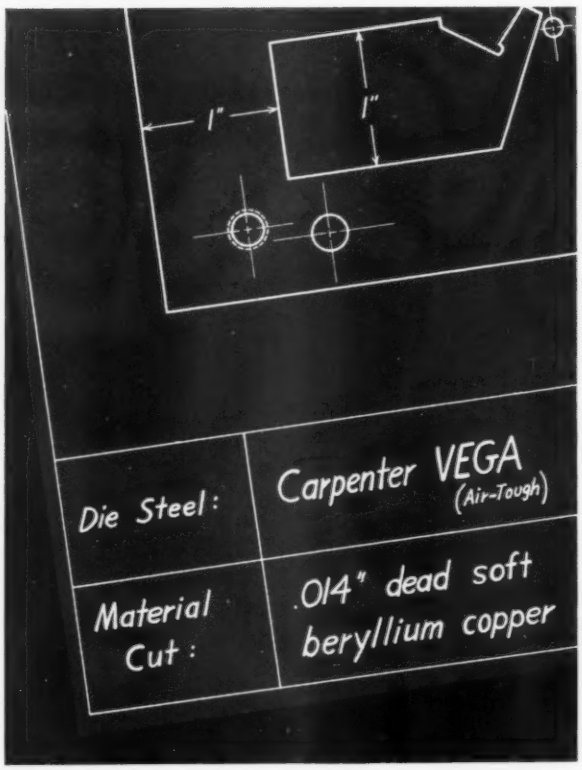


WHICH DIE STEEL WOULD YOU USE

for hardening accuracy, safety in this critical die section?

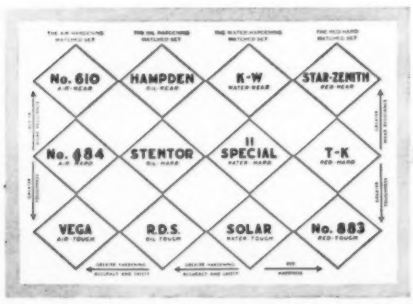
Imagine the problems involved in making and heat treating this critical die section for cutting parts from .014" dead soft beryllium copper.

Numerous cut-outs, sharp corners and thinner sections milled almost through the length of the die present man-size problems in getting the section out of heat treatment safely and accurately.

Which die steel would you be willing to trust on this ticklish job?

Here are the results reported by the diemaker, who chose Carpenter VEGA (Air-Tough) Die Steel for the job: "The section is made from a piece of VEGA 1" x 5" x 12". To hold the stock in line, we had to jig bore and hold a line of ⅛" pilots almost through the entire die length. VEGA permitted us to do this and saved *many hours of work* over a die made from small sections. The first large perforating punch was also made from VEGA. After heat treatment, the punch *entered the die perfectly*. If there was any warpage at all in the punch, we couldn't find it."

This kind of performance is readily available to you by simply calling your nearest Carpenter Mill-Branch Warehouse, Office or Distributor. Large local stocks of Carpenter Matched Tool and Die Steels assure immediate delivery.



® U. S. Patent Office, The Carpenter Steel Co., Reading, Pa.

Carpenter STEEL

Matched Tool and Die Steels

The Carpenter Steel Company, 106 W. Bern St., Reading, Pa.

Export Dept.: The Carpenter Steel Co., Port Washington, N. Y.—"CARSTEELCO"

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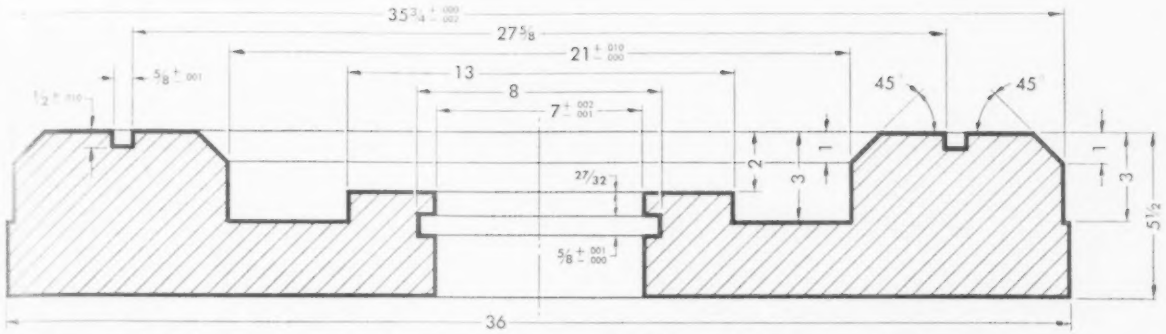
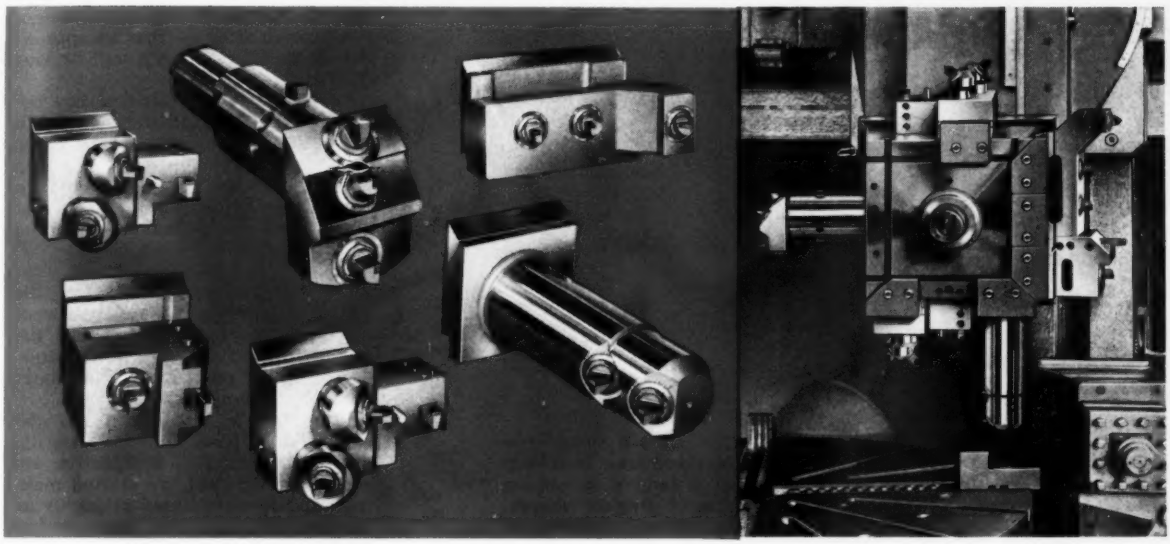


Certainly you can use Microbore Tooling on a Vertical Boring Mill

HERE'S HOW KING DID IT!



24 OPERATIONS BY CLUSTERING MICROBORE UNITS IN 6 BARS

• This tooling for a difficult job was designed and made by the Microbore Division and was used with great success by the King Machine Tool Division of American Steel Foundries. Notice that boring, facing, chamfering, turning and grooving operations were required and precise limits were held.

• The simple setup and quick adjustment of each individual Microbore unit resulted in a minimum of down time. This is typical of reports from shops where the Microbore System is used. Microbore is a basic tool which can be applied singly or in clusters for all types of precision boring, turning and facing operations.

• Proposal engineering from your prints and machine data is a unique feature of the DeVlieg Microbore System. Discuss your tooling problems with our specialists or let us send you our informative catalog.

DeVlieg Microbore System

MICROBORE DIVISION • DE VLIEG MACHINE COMPANY

2720 West Fourteen Mile Rd., Royal Oak, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 35

NOW--

Buy your Drill Bushings out of Template Production Savings

PEM Self-Clinching Template Drill Bushings offer revolutionary features that permit you to do just that.

1. Permit thin gauge template metals, aluminum or cold rolled steel—one-third the thickness required for conventionally bushed holes.
2. One-hole mounting—in the hole to be bushed. No processing of additional mounting holes. No riveting, or welding. Simply drop PEM bushing in hole and squeeze into place.
3. Compression Mounted—one or several at a time—and positively locked into position by self-clinching action of bushing shank design.
4. True alignment and center distances are automatically secured by piloting effect of shank and interference fit. Can't "cock" during riveting as no riveting is required.
5. High torque and pull out resistance are provided by back tapered shank and corrugated clinching ring.

PEM Bushings are round, one-piece hardened steel units—not assemblies. Require no indexing or nesting of irregular shapes. Provide location in closest proximity when required.

Try these revolutionary bushings—designed for faster, easier, lower cost assembly and prove to yourself that you can buy your drill bushings out of template production savings and have a "profit" left over.

Write for literature and samples for trial.

PENN ENGINEERING & MANUFACTURING CORP.
DOYLESTOWN, PENNSYLVANIA

PEM

CIRCLE INFORM-A-GRAM KEY NO. 36

. . . Month's Talk from Page 26

One Firm's Experience

This letter from Richard F. Moore, president of one of the better-known tool shops, outlines the value of apprentice training to the company:

"I started in business in 1924 with one toolmaker, a boy and myself. The boy was hired to run the errands to the hardware store and the heat treaters'. He also handled the mail and did other necessary odd jobs about the shop, including keeping the floor swept and the machines clean.

"The boy probably spent two or three hours daily on these odd jobs. The rest of his time he ran the miller, doing repetitive work, and also helped out on the shaper, lapped bushings, cut off stock and did other simple shop jobs. I don't recommend this as the best procedure to train an apprentice, but I am just bringing this up in reply to the old argument you hear so often — 'that an apprentice doesn't pay for himself' or 'our shop is too small.'

"After two years this first boy became quite handy on shop jobs. We felt that we could no longer spare his valuable time in doing the odd jobs, so we hired another boy. In a few years our first boy was a first class tool and die maker. As time went on, we hired more boys.

"When the Second World War came along, or about 1940, we, like all other industries in this area, were being pressed to expand. With the existing conditions we had no alternative but to train high school boys and other young men.

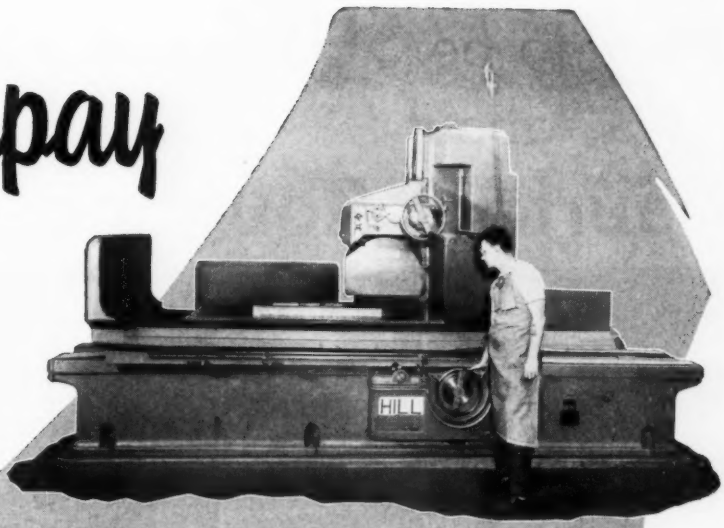
"We had a few regrets in the earlier days, however, when we did no real selecting of prospective apprentices. In 1940, we started making our selections based primarily on aptitude testing, and then a few years later added trade school instruction in related subjects.

"As time went on the need for a formal apprentice training program became more and more apparent. It cannot be denied that many good tool makers and machinists have been developed without the benefit of any formal program, but certainly their advancement and training would have been improved immeasurably had they been instructed under bona-fide apprenticeship courses.

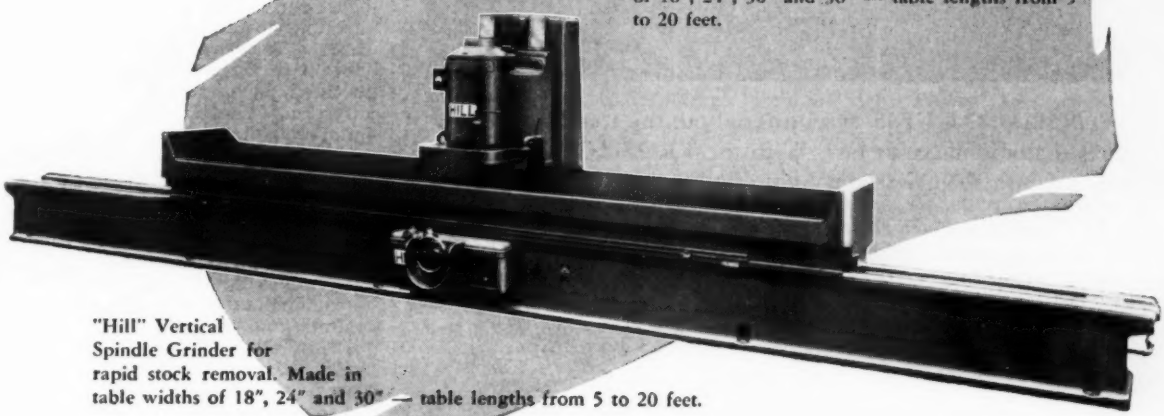
"To meet this need we formulated our own program, had it approved and recognized by the State and Federal agencies, and formally adopted it in November 1945. Since then we have had many who have successfully completed their courses. And then, of course, there are still others who started out as toolmaker apprentices and finished up as expert machine operators on the lathe, jig borer and jig grinder. Some of the

. . . Continued on Page 38

It should pay you too!



"Hill" Horizontal Spindle Grinder for a wide range of precision grinding. Made in table widths of 18", 24", 30" and 36" — table lengths from 5 to 20 feet.



"Hill" Vertical Spindle Grinder for rapid stock removal. Made in table widths of 18", 24" and 30" — table lengths from 5 to 20 feet.

Every manufacturer of heavy duty precision surface grinding equipment has:

- √ **Testimonials from satisfied users.**
- √ **Records of fine finishes produced.**
- √ **Case histories of phenominal savings over other finishing methods.**

But there are other important factors that should be considered:

- √ **Maximum accessibility and control simplicity.**
- √ **Minimum maintenance over the years.**
- √ **Longer accurate production life due to proven design methods, rigid construction and vibration-free operation.**

It has always paid the users of HILL Open Side Hydraulic Surface Grinders. It should pay you too!

Look for the added considerations before you buy!

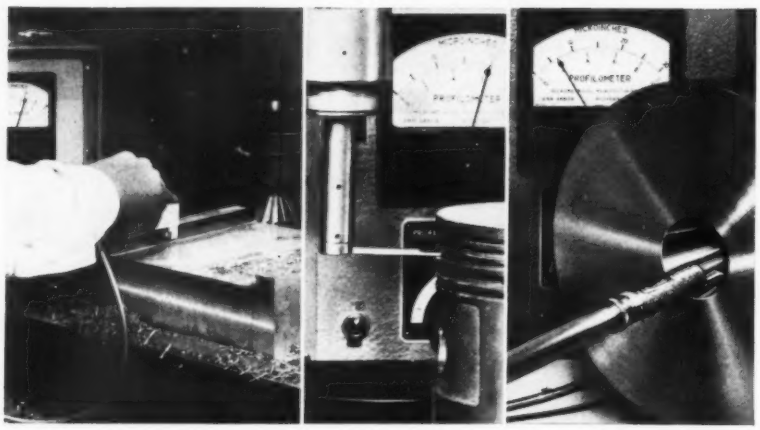
THE HILL ACME COMPANY

1201 WEST 65th STREET • • • CLEVELAND 2, OHIO

"HILL" GRINDING & POLISHING MACHINES • HYDRAULIC SURFACE GRINDERS • ALSO MANUFACTURERS OF "ACME" FORGING • THREADING TAPPING MACHINES • "CANTON" ALLIGATOR SHEARS • BILLET SHEARS • "CLEVELAND" KNIVES • SHEAR BLADES

CIRCLE INFORM-A-GRAM KEY NO. 37

How to be SURE about Surface Roughness



NO NEED TO GUESS or wonder about the roughness of parts that you make or buy. With the PROFILOMETER® at hand, you KNOW the roughness, because —

1 The Profilometer *measures* surface roughness in definite *microinch units* (arithmetical or r.m.s. average height). It eliminates the errors and uncertainties of inspection by touch or sight.

2 It is *accurate* and *dependable*—even below 3 microinches. Cannot be set to give wrong readings.

3 It's a sturdy, portable SHOP TOOL — as easy to use as a dial gage.

4 It is *versatile.* Measures almost *any* surface, internal or external, over any desired length. Measures plastics, glass, etc. as readily as metal.

5 It's been *thoroughly proven* in thousands of production and inspection departments — *since 1936.*

FREE ILLUSTRATED BULLETIN gives details; describes cost-saving applications. *Write for it!*

OTHER MICROMETRICAL PRODUCTS include the PROFICORDER® (for obtaining magnified surface profile records); WAVOMETER® (for measuring waviness around surfaces of rotation); ANDEROMETER® (for measuring the over-all quality of assembled ball bearings). Illustrated bulletins on request.

Representatives in principal industrial centers throughout the Free World

Names of above products are registered trade-marks.

MMC MICROMETRICAL MANUFACTURING COMPANY

339 S. MAIN ST. ANN ARBOR, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 38

. . . Month's Talk from Page 36

finest young mechanics in our shop today have been trained here, and without a doubt will hold key positions in our organization in the future."

Many similar case histories could be written by our progressive shops but, unfortunately, the opposite is true of many others who have not as yet seen the light.

'Sell' Apprenticeship

The best approach that I can suggest for attracting apprentices in your city to your shop for training would be through the use of the NTDMA movie — "Tool & Die Making — Keystone of Mass Production." A relatively new film, it explains the important role of tool and die making in our economy and, at the same time, shows an apprentice going through his four-year course.

The film can be obtained from Modern Talking Picture Service, a distributing agency, free of charge. It can be shown at local high schools, boys clubs or youth organization meetings to interest boys in such a career. Teachers and parents might view it to learn about the industry so they can encourage boys in this direction. When an opportunity permits, a plant tour of your shop for teachers and parents is helpful to show them first-hand the work performed in the toolroom or tool and die shop.

Local committees have been formed by Association members in many tool centers to promote a better understanding of the need for training and to help screen and direct suitable applicants to shops which have requested apprentices. This is very helpful and gives a broader scope to the problem. Often this committee is in contact with the State Employment Service and State Apprenticeship Council.

The best source of apprentices, however, is from within your own shop. Look at the records of your unskilled and semi-skilled help to see if any qualify. Sons or brothers of employees might also be interested. This latter source is excellent for employee morale, and gives the benefit of the "promoting from within" policy.

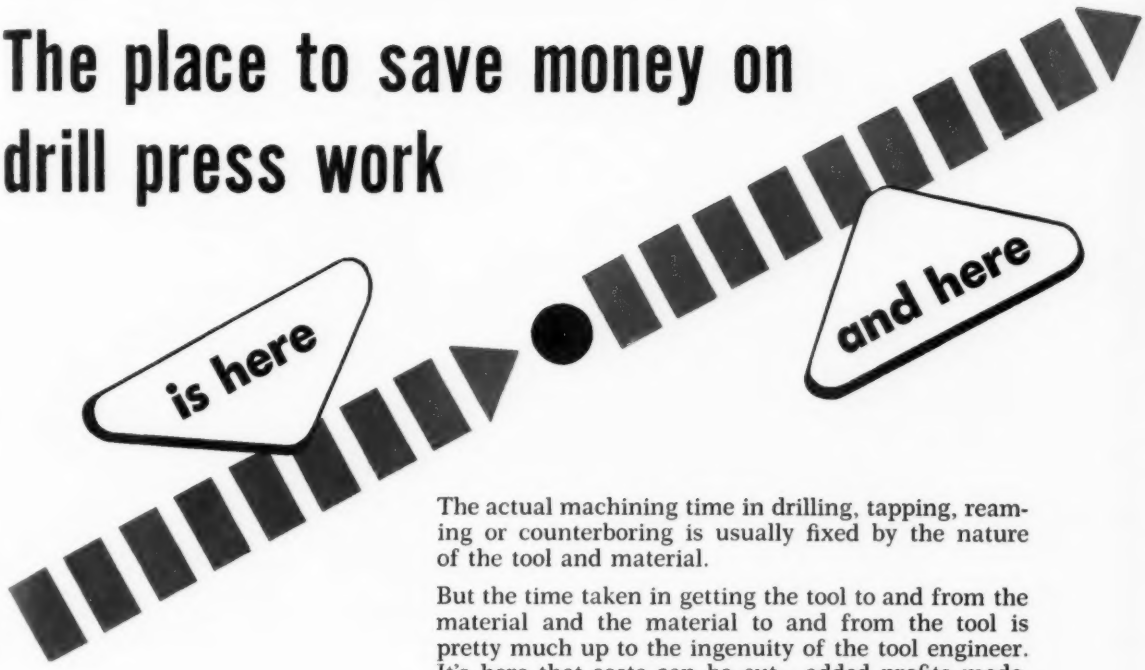
Other methods are also open — TV showings of the movie have been well received; radio talks by tool and die shop leaders have been used to create an awareness of the opportunities and needs for apprentice training.

It's Your Responsibility

Review your own situation. Are you doing your share? If you maintain a tool room to build your own dies, is your training adequate to build sufficient journeymen to provide needed replacements and to permit expansion in the years ahead?

. . . *Continued on Page 42*

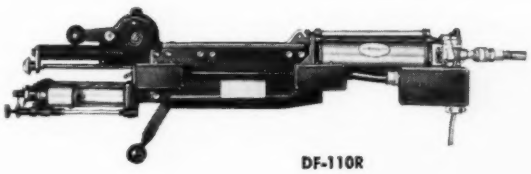
The place to save money on drill press work



The actual machining time in drilling, tapping, reaming or counterboring is usually fixed by the nature of the tool and material.

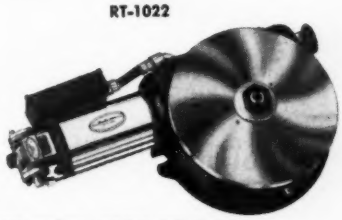
But the time taken in getting the tool to and from the material and the material to and from the tool is pretty much up to the ingenuity of the tool engineer. It's here that costs can be cut—added profits made.

It's here that two Bellows "Controlled-Air-Power" Devices can fit into your picture: The Bellows Drill Press Feed and the Bellows Rotary Work Feed Table. The Bellows Drill Press Feed attaches to the star wheel shaft of any standard drill press. A touch on the operating lever and the Feed advances the quill rapidly to the work, feeds the tool under hydraulic control through the work—and returns the quill quickly to starting position. The Bellows Rotary Work Feed Table feeds the parts swiftly, accurately and safely to the tool. All the operator has to do is load and unload—the rest is automatic.



DF-110R

RT-1022



WRITE FOR THESE TWO FREE BOOKS

Quick reading facts that will help you make more money on your drill press operations. Write The Bellows Co., Akron 9, Ohio, Dept. TP-157.

In Canada: Bellows Pneumatic Devices of Canada, Ltd. Toronto, Ontario

Ask for Bulletins DF-110R and RT-1022.

736B

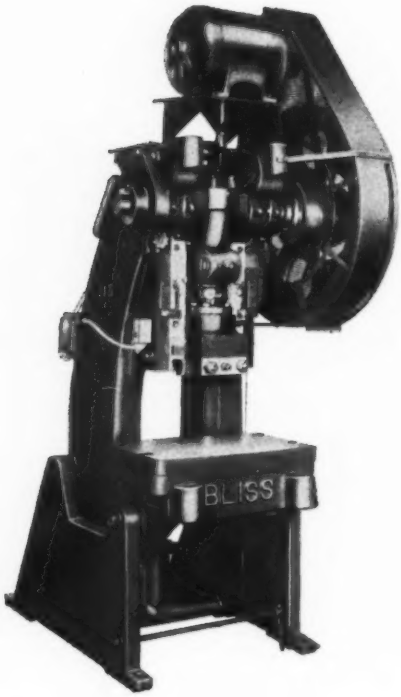
The Bellows Co.

AKRON 9, OHIO

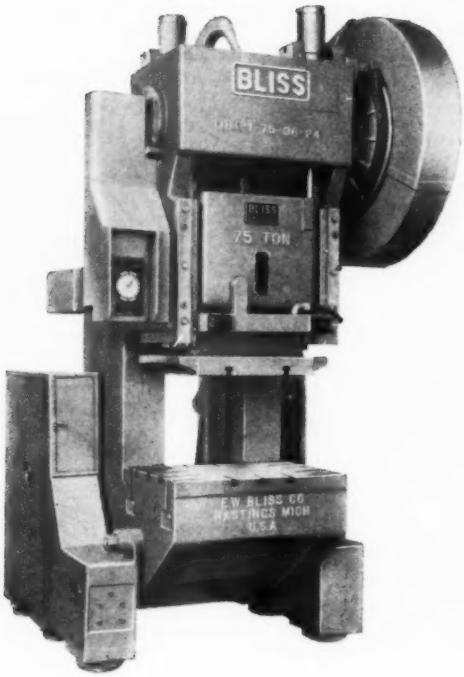
MANUFACTURERS OF "CONTROLLED-AIR-POWER" DEVICES FOR FASTER, SAFER, BETTER PRODUCTION

CIRCLE INFORM-A-GRAM KEY NO. 39

Bliss inclinables offer you a wider



Standard Inclinable Presses—as furnished in the 10 to 125 ton range. No. 21-S press, 45 ton capacity, shown here.



Enclosed Inclinable Presses—75 to 200 tons. A 75-ton capacity model is shown here.

More standard types Bliss builds *23* standard inclinables—open-back inclinables, JIC inclinables, hydraulic inclinables, double-crank inclinables . . . offers a wider range of capacities and bed areas than any other make.

More standard clutches The Bliss Positive rolling key clutch and a choice of Bliss crankshaft or driveshaft mounted air friction clutches have been proved on thousands of presses. Bliss has the type of clutch best suited to your work.

More standard feeds Bliss designs and manufactures its *own* line of roll and dial feeds. This single responsibility for both presses and feeds is the press user's assurance that feeds are easily installed and easily adjusted.

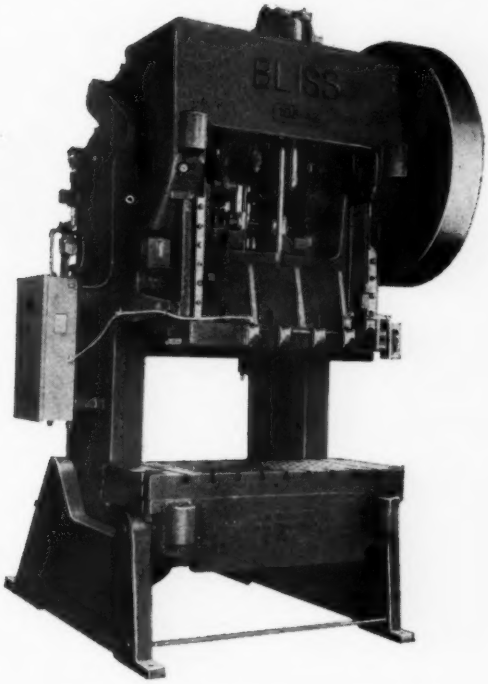
More standard cushions Five different types of cushions, in a range of sizes that meet every need, make any Bliss inclinable a double-action press. Cushions are especially designed for the press and the presses designed to receive them—either assembled to press before shipment or easily installed years later.

. . . And a million dollar parts and service program to protect your investment!

Because Bliss *mass-produces* its inclinables, maintaining a stock-pile of spare parts is a simple matter. The million-dollar inventory of spare parts of Bliss' inclinable plan is by far the largest in the industry and includes clutch plates and parts, shafts, gears, pinions and the like. Moreover, Bliss maintains a separate, specially-trained organization whose sole purpose is to service your spare parts needs as quickly as possible.

choice of standard types and sizes

Standard Enclosed Inclinable as furnished in 150 and 200 ton sizes. No. 29, 150-ton capacity, is shown above.



Double-crank Inclinable Presses—from 18 to 175 tons. No. 108, of 100 tons capacity, is shown here.

A few of the reasons why BLISS inclinables outsell all other makes

... *and always have*

- Cast Meehanite frame—stronger, tougher. Fine grain structure dampens noise and vibration.
- Clutches—whose design has been proved by the thousands now in use.
- Gibs are close fitting, extra long, and insure accurate slide alignment at all points in the stroke. Simple to adjust so that original accuracy can always be maintained.
- Choice of hand, semi-automatic or automatic lubrication.

NEW catalogs now available

32 pages—describes frames, feeds, clutches, cushions and complete line of open back and enclosed single-crank inclinable presses. Gives dimensions and specifications. Catalog No. 2-D.

12 pages—describes these versatile extra-width double-crank presses. Gives dimensions and specifications for entire line. Catalog No. 3.

BLISS
SINCE 1857

BLISS is more than a name ... it's a guarantee!

E. W. BLISS COMPANY, Canton, Ohio

Presses, Rolling Mills, Special Machinery

U. S. Plants in Canton, Cleveland, Salem and Toledo, Ohio; Detroit and Hastings, Michigan; San Jose, California; Midland and Pittsburgh, Pa. *Branch offices in* Burbank, Chicago, Cleveland, Dayton, Detroit, Indianapolis, New Haven, New York, Pittsburgh, Philadelphia, Rochester, Salem, San Jose, Toledo, Washington, D. C.; and Toronto, Canada; E. W. Bliss (England) Ltd., Derby; E. W. Bliss Co. (Paris), France. *Other representatives throughout the world.*

CIRCLE INFORM-A-GRAM KEY NO. 41

BARNES ROCKET BLADES CUT CUTTING COSTS

TOUGH!
FLEXIBLE!
SAFE!

ROCKET BLADES FEATURE *"Gradient Hardness"*

FAST—ACCURATE CUTS

Barnes Rocket Blades slice through tough alloy bar stock. Parallelism of the 2 11/16" cuts are held to within .005".

BARNES ROCKET BLADES, made of quality high speed steel, feature *Gradient Hardness. Gradient Hardness* produces hard, sharp teeth backed up by a semi-hard, tough flexible blade. The result is a one piece blade combining peak cutting ability with strength and safety. ROCKET blades will withstand sudden shock loading without breaking or shattering. You are sure of a safe, efficient blade for your toughest sawing jobs.

Call Your Barnes Industrial Distributor
for
BARNES ROCKET
POWER AND HAND
HACK SAW BLADES

WHEN CUTTING COUNTS BARNES **COUNT ON BARNES**

W. O. BARNES CO., INC.
1297 TERMINAL AVENUE DETROIT 14, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 42

. . . Month's Talk From Page 38

If you purchase dies from the outside, look at your sources and find out whether they are doing their share to insure a continuation of quality workmanship in the future. If not, encourage them to change their ways and begin the necessary training program.

If you're now ready to initiate an apprentice training program, read "Train Die Makers or Die," American Machinist Special Report No. 385, and request from the NTDMA the kit prepared to assist member shops and all in the industry in apprentice training work. Even neighboring shops can be helpful by showing what their training program consists of and how to go about setting up your own.

There can be no question about the need of more and higher skilled men in our industry. Estimates have been made that the industry's tooling requirements will be 50% greater by 1970. This will mean an even greater proportion of skilled manhours needed in years to come.

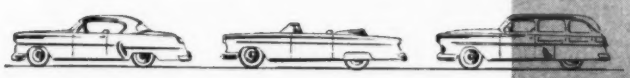
The tremendous progress made during the first half of the twentieth century will undoubtedly seem insignificant in the light of future developments. These developments as well as the increased production which will be demanded by future generations charge those of us who are making a living in the tool, die and stamping industries with the inescapable duty to train new men for the future.

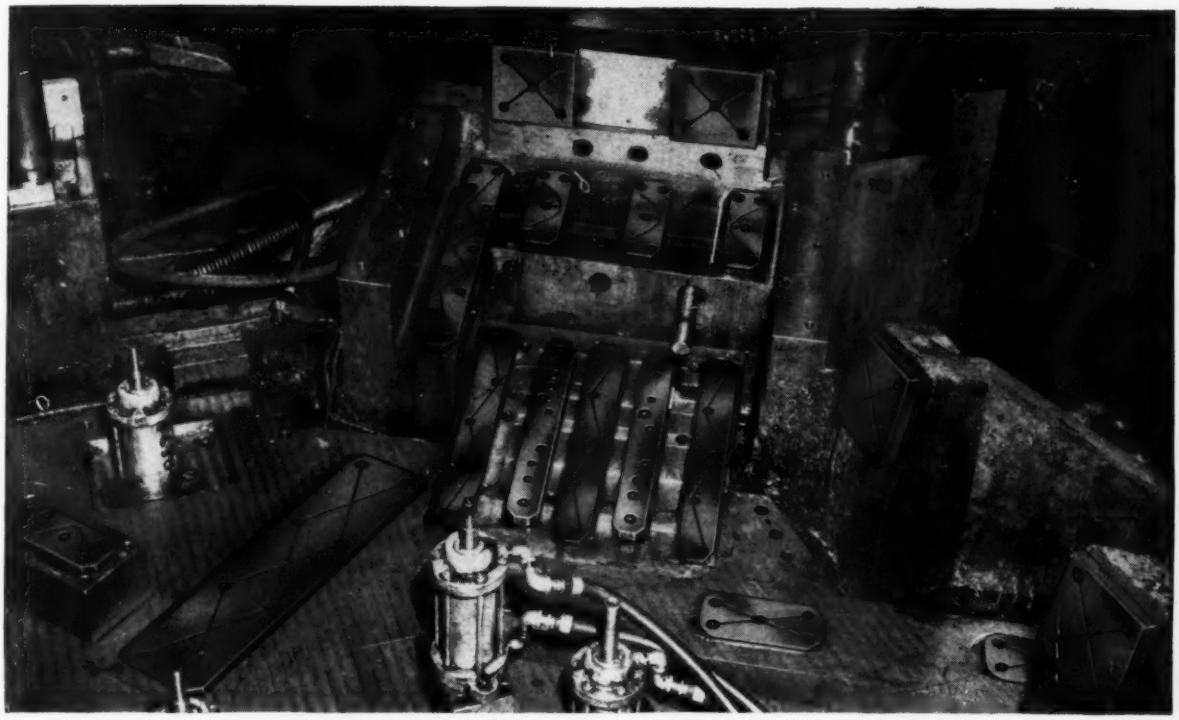
Complete Information About The New Pocket Size Metal Working Magazine Can Be Obtained By Writing To:

METLFAX MAGAZINE
1975 LEE ROAD
CLEVELAND 18, OHIO

If You Don't Know the Facts About Metlfax It Will Be to Your Advantage To Write Now for Your Copy.

IT'S OK WHEN YOU FOLLOW THE LEADERS





The automotive industry stands as a leader in technological advancement and cost-cutting production techniques. That's why today practically every important automobile manufacturer is using Ohio Knife Aluminum Bronze Wear Plates on body dies.

By a unique cladding process, long-wearing aluminum bronze is bonded to a machinable steel base. Cost is drastically lower when compared to solid cast bronze plates. A finer quality bearing surface is obtained, resulting in longer life. When fitting is required to suit die, steel backing of plate is easily machinable, and no difficulty is encountered drilling or counter boring through bronze surface. OK aluminum bronze plates are applicable wherever a die has a sliding or cam action. A large selection of OK aluminum bronze plates carried in stock . . . finished ground, flat and parallel . . . ready to ship. Specials made to your specifications.

Manufacturers for the metalworking industry of: SLITTER KNIVES • SHEAR BLADES BRONZE WAYS • WORK-REST BLADES • CUT-OFF BLADES • SCRAP CHOPPERS HARDENED SPACERS • BALL RACES • HARDENED WAYS • WEAR STRIPS • GIBS

For free bulletin "SLITTING—A Basic Guide for the New Operator", write Dept. 29-LL

THE OHIO KNIFE CO.

CINCINNATI 23, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 43

NEW YORK

"An irregular-shaped hole being ground to within .0002" on the No. 2 Moore Jig Grinder. The machine can do contour grinding of almost any size and shape."—*from facilities booklet of August W. Holmberg & Co., Inc., Flushing, N. Y.*

MISSOURI

"Two No. 2 Moore Jig Borers...permit Ehrhardt to locate and bore holes accurately and to inspect the finished work."—*from facilities booklet of Ehrhardt Tool and Machine Co., St. Louis, Missouri.*

"FACILITIES, FACILITIES, FACILITIES..."

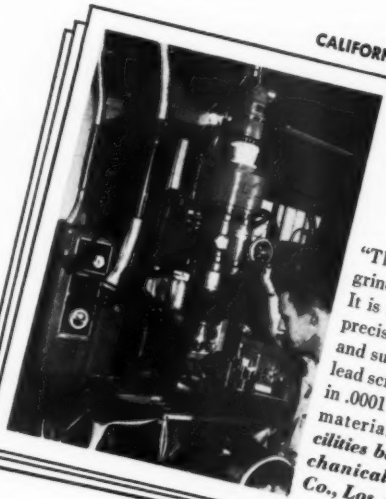
How Leading Tool and Die Shops Across the Nation Feature MOORE Jig Borers and Jig Grinders

Today, top contract tool and die shops often rely on illustrated booklets to sell prospects on their facilities. And they often rely on pictures of their Moore Jig Borers and Jig Grinders to indicate the degree of precision work they can do. It's particularly significant that leading contract shops choose Moore machines for "double duty"—in the toolroom and on the printed page—for these owner-managed firms are understandably deliberate and judicious in selecting machine tools. Write today for detailed bulletins on Moore's top-billed toolroom teammates.

MOORE SPECIAL TOOL COMPANY, INC.
726 Union Avenue, Bridgeport 7, Connecticut

HOLES, CONTOURS AND SURFACES
Moore's *all-new* book tells you how to produce tools, dies and precision parts *the modern way*. 424 pages, 495 illustrations. $5 in U.S.A., $6 elsewhere.

CALIFORNIA



"This precision jig grinder is a Moore No. 2. It is used for producing precision holes, contours and surfaces to accurate lead screw settings within .0001" in heat-treated materials."—*from facilities booklet of Mechanical Specialties Co., Los Angeles, Cal.*

ADD MOORE TOOLS TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTO-CRUSH WHEEL DRESSERS • PRECISION ROTARY TABLES • HOLE LOCATION ACCESSORIES

CIRCLE INFORM-A-GRAM KEY NO. 44

POP'S school of filing

CLEM DON'T BELIEVE POP WHEN HE SAYS THE NICHOLSON FOLKS MAKE 12 PERFECT FILES IN EVERY DOZEN
POP SAYS WAIT TILL HE USES A COUPLE OF DOZEN. THEN HE'LL KNOW!
SR

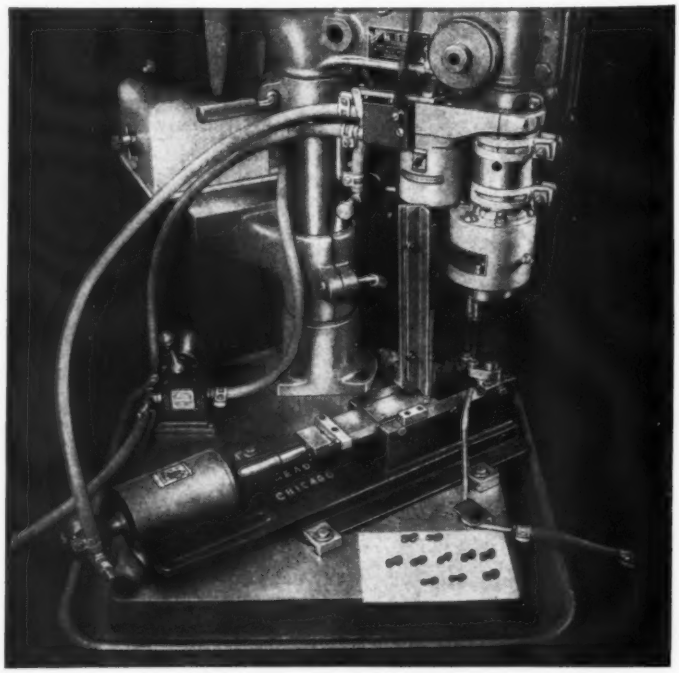
12 PERFECT FILES IN EVERY DOZEN • 12 PERFECT FILES IN EVERY DOZEN • 12 PERFECT FILES IN EVERY DOZEN • 12 PERFECT FILES IN EVERY DOZEN • 12 PERFECT FILES IN EVERY DOZEN • 12 PERFECT FILES IN EVERY DOZEN • 12 PERFECT FILES IN EVERY DOZEN • 12 PERFECT FILES IN EVERY DOZEN

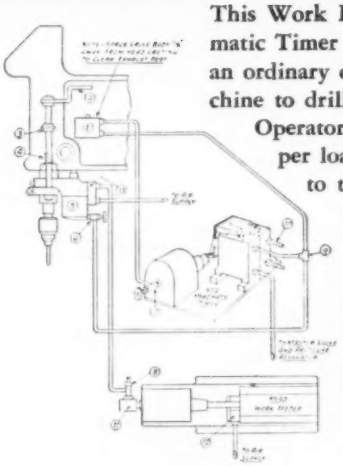
NICHOLSON U.S.A. **NICHOLSON FILE COMPANY, PROVIDENCE, RHODE ISLAND**
(In Canada: Nicholson File Company of Canada Ltd., Port Hope, Ontario)
BLACK DIAMOND U.S.A.

NICHOLSON FILES *A FILE FOR EVERY PURPOSE*

CIRCLE INFORM-A-GRAM KEY NO. 45

AUTOMATION WITH AIR POWER





This Work Feeder, with the aid of a Meadmatic Timer and Drill Press Feed, transforms an ordinary drill press into an automatic machine to drill twin holes in Chain saw links. Operator merely keeps the vertical hopper loaded—the machine delivers them to the drills, holds them firmly and ejects them when finished. Material is tough alloy steel, ranging in thickness from 1/8" to 1/4". Hole spacing is held to .0005" by bushings mounted in plate with micro adjustment. Production is 600 to 900 per hour, depending on thickness.

Write for free illustrated booklet of 44 "Examples in Air Power Automation".

MEAD

MEAD SPECIALTIES COMPANY
4114 N. Knox Ave., Department HA-17, Chicago 41, Illinois

PATHFINDER IN AIR POWER AUTOMATION

CIRCLE INFORM-A-GRAM KEY NO. 46

People Are Important

by Erwin K. Taylor, Ph. D.
President
PERSONNEL RESEARCH AND DEVELOPMENT CORP.
Cleveland 20, Ohio

PACKAGES AND PANACEAS

PERHAPS BECAUSE personnel psychology is a rather young science, some of us are still in the patent medicine phase of dealing with our personnel problems. There are package programs available in almost any personnel area — in personnel selection, in performance evaluation, and in foreman training. In addition, there are tools and techniques valuable in various specific areas that have been oversold by their advocates. Some "experts", in other words, have happened upon a "solution" and advocate its indiscriminate application to practically all problems.

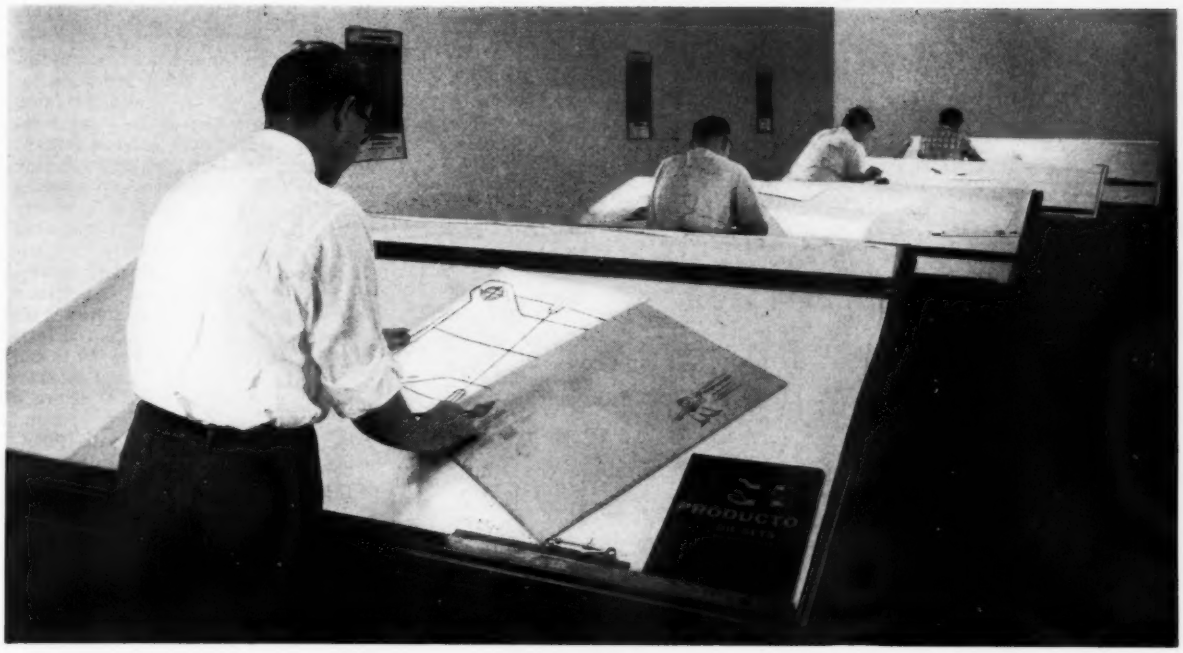
Some managers are prone to believe that any use of psychological tests constitutes "scientific selection." While it is true that many scientifically designed selection programs do incorporate the use of some psychological tests, it is equally true that the blind use of these instruments is no more scientific than picking names out of a hat. The physician looking at a white pill or green liquid could not know for what purpose it was intended nor how effective it might be. Similarly, the industrial psychologist confronted with a new test would not, without a great deal of information about it, be able to say whether it was a good test.

Thousands of tests are bought and administered annually to job applicants. The scores on a large portion of these, we suspect, bear no relationship to later job success. In most cases, we do not know whether a test is valuable or not because no one has taken the time or trouble to find out how good it really is.

Test publishers, in my opinion, are too prone to make their wares available even to those who do not have the training and background necessary to determine the test's applicability. Some organizations have

. . . Continued on page 48

Why the Die Designer Prefers PRODUCTO Die Sets



He can specify Producto with complete confidence

The die designer likes to specify Producto die sets on his blueprints because they are a nationally-accepted "brand." They're easy to get anywhere... and delivery is prompt.

He favors Producto because he knows he never has to compromise his die design. Even if the die layout is a little unusual, he will be able to select a die set to accommodate it from Producto's wide range of thicknesses and styles.

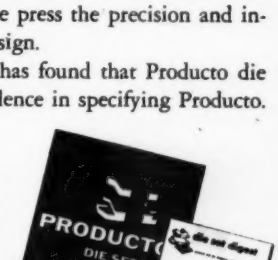
He also knows Producto has the equipment that can cut his tooling costs by letting him adapt his sets to a more economical *basic* design. Only Producto offers him complete foundry, pattern-making, welding and machining services for his special requirements.

The die designer recognizes Producto's Qwik-Fit Guide Pins as an important new feature that die makers want. He specifies them because they save up to 75% of the time normally required for die set assembly and disassembly.

The die designer likes to use Producto's new catalog, the industry's most practical tool. His die layout is simplified when he uses Producto die set templates. And Producto provides him with cost-saving ideas in the DIE SET DIGEST.

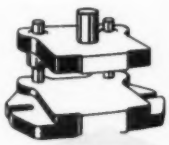
Most important, he can depend on *consistent* Producto die set accuracy to transfer from the drawing board to the press the precision and ingenuity of his die design.

Yes, the designer has found that Producto die sets justify his confidence in specifying Producto. You will, too.



TWO FREE AIDS to more economical, efficient use of die sets are available from Producto. All-new CATALOG NO. 11 makes ordering and selection job easy. DIE SET DIGEST gives valuable tips for designers, builders and users of dies. Write for them today.

THE PRODUCTO MACHINE COMPANY
970 Housatonic Ave., Bridgeport 1, Connecticut



Wherever die sets are used

PRODUCTO

PRODUCE MORE WITH PRODUCTO PRECISION DIE SETS

CIRCLE INFORM-A-GRAM KEY NO. 47

DPS has

the technical know-how to "*engineer*" more speed and profit into your assembling operations.

● The signal success of DPS trained engineers in adapting power equipment to the individual feeding and assembling needs of industrial plants everywhere is assurance that they can likewise solve your special problems. In our broad line of

SELECTIVE PARTS FEEDERS
POWER SCREWDRIVERS
SPECIAL ASSEMBLING MACHINES

equipment can be selected, and custom features incorporated, to fit your requirements. Plan now to use DPS modern assembling methods. Tell us your set-up. Write for catalog and further details.

POWER SCREWDRIVERS
An extensive, versatile line in both bench and pedestal types.

BOWL FEEDER
Electrical vibratory type to feed parts that cannot be tumbled.

BARREL FEEDER
with stationary ring cover for heavy-duty production.

BARREL FEEDER
Popular motorized type, for parts requiring critical selection.

DETROIT POWER SCREWDRIVER CO.

2827 W. FORT STREET • DETROIT 26, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 48

. . . Packages From Page 46

made a pretty good thing of selling testing packages. No federal laws and few state laws exist to protect the unwary personnel department from the installation of useless tests. This is a field in which the slogan, "let the buyer beware," still prevails.

There is nothing to prevent any individual or group from throwing together a number of questions related to a given selection area — say foremanship — and by a good salesmanship foisting them on unsuspecting industry. While out-and-out quacks exist, they are probably not nearly so numerous as the well meaning zealot who becomes overly enthusiastic about his program and generously offers to pass it on to his friend in another company. Sometimes an individual organization gets the testing bug and the executives try to sell their approach to their associates in other organizations. Even where a testing program is working well and effectively in one corporation, it cannot be bought whole-hog and applied to another seemingly similar situation with any guarantee of success.

While I was with the Adjutant General's Office during the war, I had occasion to try the same battery of tests on people occupying identical positions in each of the four Ports of Embarkation — New York, New Orleans, San Francisco and Los Angeles. The organization charts for these four installations were common to all four, yet different tests were effective at each of the installations. If we had blindly applied the findings from any one of the four to any of the others, we would have been way off base and would have done more harm than good. The differences, of course, stem from the fact that each port was drawing its applicants from a different labor market. Subtle differences in the management philosophy existing at each placed different emphasis on the various phases of the job, and finally the management at each of the Ports expected somewhat different performances than were expected by the management of each of the others. These differences were probably smaller than exist usually between two companies in the same or in closely related fields. Yet, they were big enough to alter the usefulness of tests from one installation to another.

Please do not take any of what I have written above to imply that the use of tests in selecting people at either the hourly or salary level is of no value. Quite to the contrary. In many situations the use of psychological devices are of real value. But, they are specialized and technical tools. A test that may be effective in one situation may be useless in another. There are many competent industrial psychologists qualified to

. . . *Continued on page 51*

Presenting the new

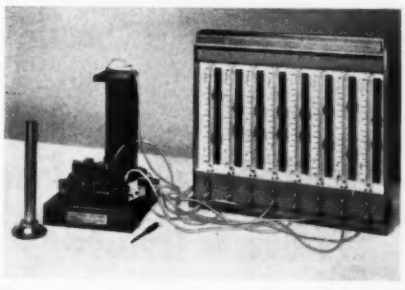
DEARBORNAIRE

COLUMN-TYPE AIR GAGING INSTRUMENT

Never before has there been an air gage instrument quite like the new Dearbornaire! For it incorporates a host of advanced design features that give you greater versatility and ease of operation with finer accuracy, minimum maintenance and lower gaging costs.

The characterized internal taper of its exclusive new glass tube assures positive linear accuracy over the full extent of the calibrated scales. Its zero-centered scales permit faster and easier reading . . . whether used for normal parts inspection, for statistical quality control, or as a tool setting gage. Interchangeability of its basic component parts simplifies conversion from one amplification to another . . . saves time, cuts costs. What's more, Dearbornaire's new higher rated pressure system and built-in circuit restrictions make it virtually self-cleaning . . . eliminate nuisance interruptions for service, reduce down-time to a minimum.

Single and multiple column instruments available now in standard amplifications of 1250-1, 2500-1 and 5000-1. Free demonstration arranged upon request. Write for complete information today!



Multiple column Dearbornaire instrument and a special fixture equipped with Dearborn contact cartridges to check eight close tolerance dimensions at one time.

AIR GAGE DIVISION

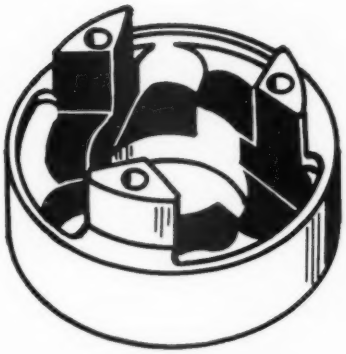
DEARBORN GAGE COMPANY

22038 BEECH STREET DEARBORN, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 49

CUSTOMER SPECIFIED

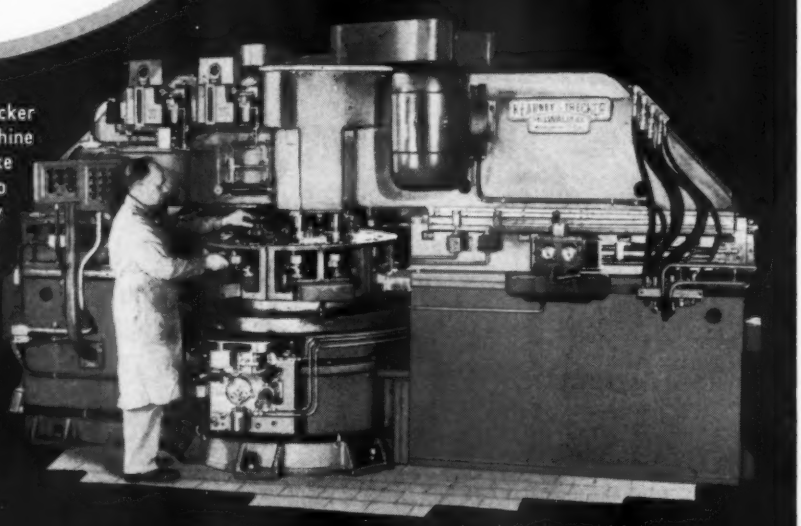
An automotive manufacturer recently asked Kearney & Trecker to design and build a special machine which would increase production milling of three pads and three pockets on transmission rear brake drums.



Black indicates machined pads and pockets on transmission brake drum.

KEARNEY & TRECKER DESIGNED

Here is our design. It's a Kearney & Trecker six-station rotary indexing milling machine which mills 162 transmission rear brake drums per hour. It does the work of two machines, each of which could mill only one workpiece at one time. With the new unit, six pieces are milled at once. A prominent feature of this machine was the application of standard Kearney & Trecker units . . . a 48" rotary index table and a 24" feed slide. This type of design appreciably decreases the overall cost of the machine. All six spindles are contained in one head which is bridged over the table. Retractable quills raise and lower the spindles.



New production efficiency starts with Kearney & Trecker Milwaukee machine tools

This typical example proves you can reduce costs and start on the road to higher production with machines designed and built by Kearney & Trecker's Special Machinery Division. With more than 50 years' experience in machine design and manufacture, Kearney & Trecker has all the ingenuity and skill required to solve special machining and production problems.

Why don't you take advantage of our abilities? They can pay off in profits for you. Your Kearney & Trecker Special Machinery Division representative will be pleased to give you all details. Call him today!

For more details on the machine illustrated ask for Data Sheet No. 1044. The free booklet "Doorway to a proven method for solution of big and small metalworking problems" is also yours for the asking.

KEARNEY & TRECKER MILWAUKEE

Special Machinery Division

MILWAUKEE 14, WISCONSIN, U.S.A.

Builders of Precision and Production Machine Tools Since 1898

CIRCLE INFORM-A-GRAM KEY NO. 50

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Scott Machine Tool Co.
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MacCorkle Ave.

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Scott Machine Tool Co.

CHICAGO, ILL.
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2363 University Ave.

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Todd Machinery Co.
4165 Holloway Drive

SAN FRANCISCO, CAL.
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SAN JOSE, CALIF.
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Dawson Mach. Co.
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SHREVEPORT, LA.
Peerless Supply Co., Inc.
701 Spring St.

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Syracuse Supply Co.
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TULSA, OKLA.
White Star Mach. Co.
104 Boulder Bldg.
19 West 10th Street

WICHITA, KAN.
White Star Mach. Co.
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CANADA
MONTREAL
OTTAWA
QUEBEC
TORONTO
WINDSOR
Williams & Wilson Ltd.

CIRCLE INFORM-A-GRAM KEY NO. 50

. . . Packages From Page 48

advise you or your personnel department on the use of selection aids. So, if you are thinking about the use of more modern techniques, it's a good idea to get some sound professional advice before taking the plunge.

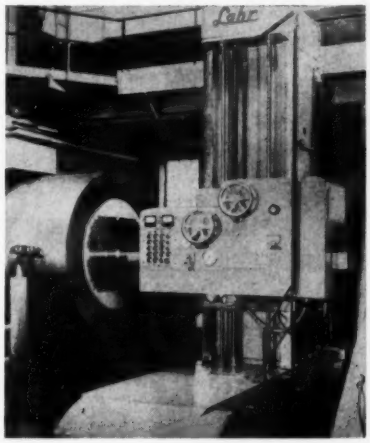
Selection testing is but one area in which packages and panaceas should be looked on with a very jaundiced eye.

—— • ——

DRILL MULTIPLE DEEP HOLES WITHOUT DRIFT

Specifically designed for the metalworking industries, Model 662-M-1 drilling machine drills to a depth of 24" with a maximum drift of 0.001" to 0.0015" per foot of depth.

A drift of this minimum means that drilling in a single setting of the work will allow a greater number of identical holes to be contained in a given area. No appreciable tolerance will have to be considered for drift, and the remaining wall thickness between holes can be calculated for working strength only.



The drill spindle operates over a 36 sq ft area without resetting the material. Rapid indexing controls eliminate layout and drill jigs entirely.

Multiple drilling of stacked pieces provides accuracy never before possible on larger surfaces. This accuracy is accomplished by using a single flute gun drill with provisions for a coolant-wash combination which permits penetration without retraction for clearing chips.

Contact The Lahr Machine & Tool Corp., 3400 Maplewood Ave., Toledo 10, Ohio, for further information, or — **Circle Inform-A-Gram No. D-1.**

LIVE CENTERS

Guaranteed to match the accuracy of your lathes

IDEAL'S simplified ordering plan ends tool room headaches. Get exactly the live center you need when you need it — right from distributor stocks. Widest range of models, sizes and capacities — all precision-built for continuous close tolerances.

SOLD THROUGH AMERICA'S LEADING DISTRIBUTORS
In Canada: Irving Smith, Ltd., Montreal
GET CATALOG DATA

IDEAL INDUSTRIES, Inc. IDEAL
1334 Park Ave., Sycamore, Illinois

Please send us data on IDEAL'S complete line of LIVE CENTERS.

Name_____

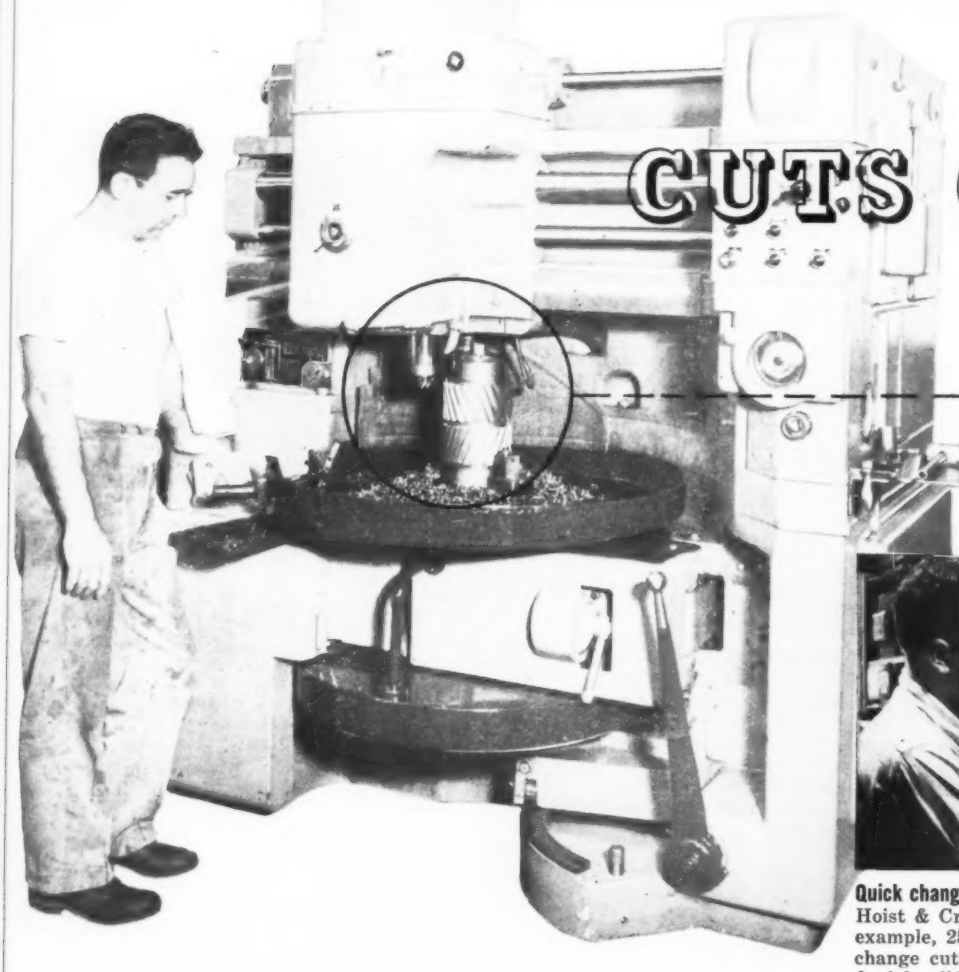
Company_____

Address_____

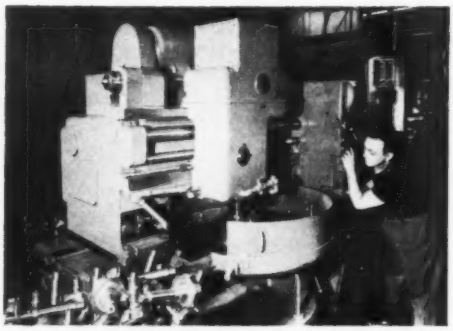
City_____ Zone____ State_____

CIRCLE INFORM-A-GRAM KEY NO. 51

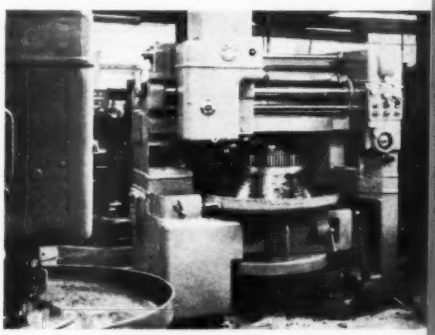
CUTS COSTS



Quick change cuts costs on short runs: at Silen Hoist & Crane Company, Brooklyn, N. Y., fo example, 25 seconds is all the time needed t change cutter speed, depth of cut and rotar feed for different sized sprockets.



Five times faster than the machines they replaced on a variety of jobs, 36-Type Gear Shapers set many cost-cutting records at New Process Gear Co., Syracuse, N. Y. Part shown cut in one operation. Rate: 135 finished per day.

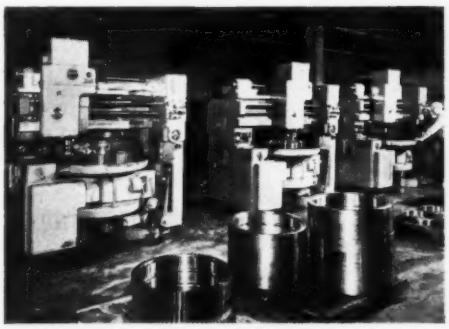


Faster on gears up to 36″ P.D., two 36-Type ma chines replaced *five* older machines at Samue M. Langston Co., Camden, N. J. 22.250″ P.D. 4 D.P. steel spur shown is cut in 2½ hours. Production time on previous machine—10 hours.

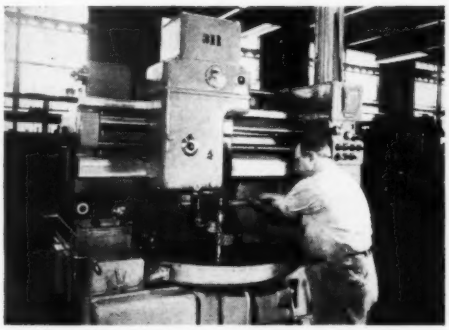
THE
PRECISION
LINE

5 WAYS

FELLOWS 36-TYPE GEAR SHAPER



Heavy cutting power: 36-Type Gear Shaper removes 93 cubic inches of stock (26 lbs.) from the blank in just two cuts to make this 25.3" P.D., 3 D.P. gear at Fairfield Manufacturing Co., Lafayette, Ind. Total time: 258 minutes.



More efficient small gear cutting, too: 57 minutes is all it takes to cut each hand of this 6.486" P.D., 5/7 D.P.; 23° H.A., herringbone pinion at Snow-Nabstedt Corporation, Hamden, Conn., on their 36-Type Gear Shapers.

Here's the way to lower gear production costs even though over-all costs keep rising! These major firms (and many others) have proved that fast, accurate Fellows 36-Type Gear Shapers have the power, speed and versatility to cut production costs . . . often by more than 50%!

Set-ups are fast and simple for a wide range of jobs up to 36" P.D. Cutter speeds from 18 to 300 strokes per minute are available through a selector dial. Four rotary feeds are available through a feed lever, additional feeds through two pick-off gears. Semi-automatic fixtures may be used to decrease loading time.

Whether for long runs or many varied jobs, the powerful, versatile Fellows 36-Type Gear Shaper can very probably lower *your* gear production costs. Your Fellows Representative can give you valuable facts and figures about the benefits of investing in the Fellows Precision Line of gear production equipment. Write, wire, or phone any Fellows office.

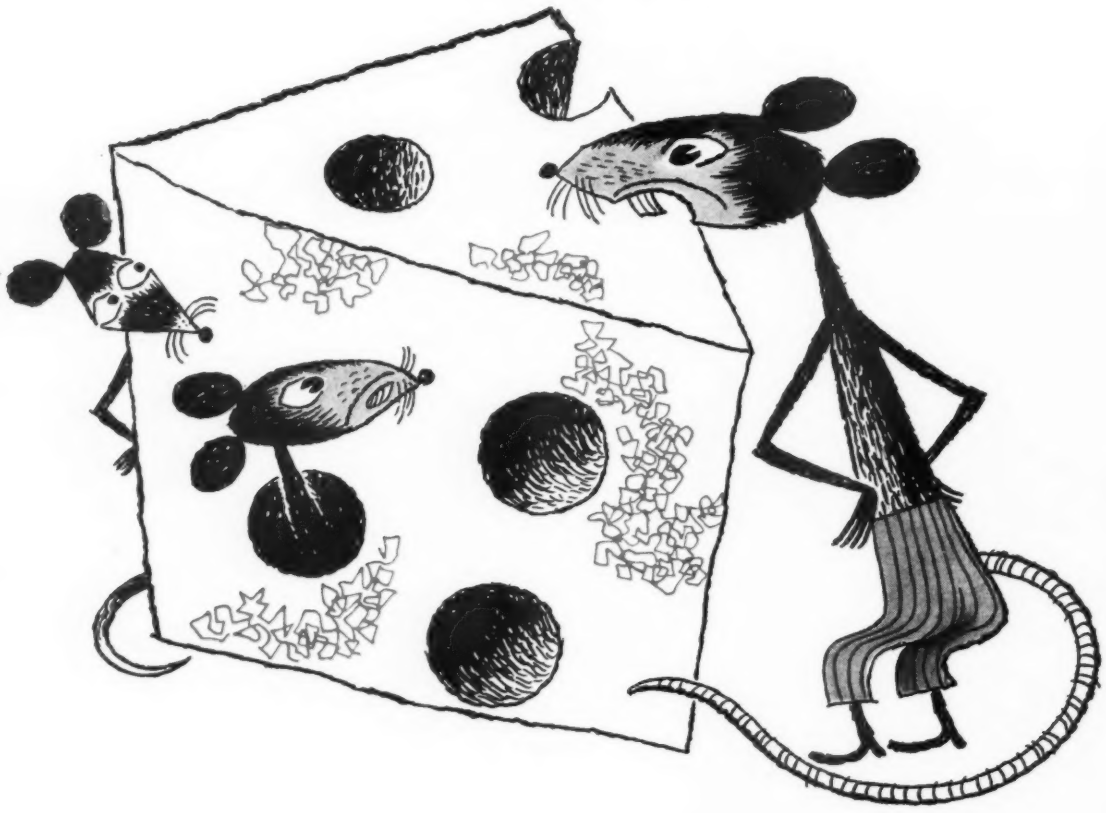
THE FELLOWS GEAR SHAPER COMPANY
78 River Street, Springfield, Vermont
Branch Offices: 1048 N. Woodward Ave., Royal Oak, Mich.
150 West Pleasant Avenue, Maywood, N. J.
5835 West North Avenue, Chicago 39
6214 West Manchester Avenue, Los Angeles 45

Fellows *Gear Production Equipment*

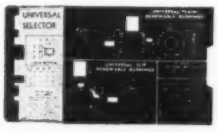
CIRCLE INFORM-A-GRAM KEY NO. 53

WHAT...

NO UNIVERSAL DRILL BUSHINGS?



Wherever there are holes to drill using jigs or fixtures, it pays to specify Universal drill bushings. Machined from finest quality steel, Universal bushings have super-finished bores which lengthen tool life and reduce bushing wear over long production runs. Knurled heads provide quick, sure grip. Blended radii on top-inside diameters help prevent tool hang-up and breakage. Standard sizes and lengths in stock for immediate delivery.



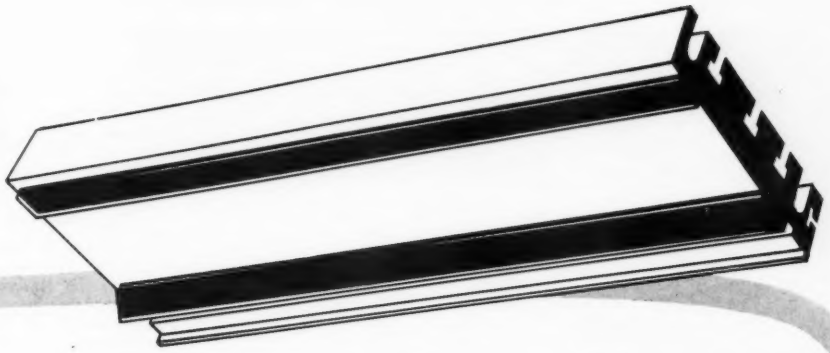
FREE UNIVERSAL SELECTOR. Gives all engineering data for selection of all types and sizes of drill bushings up to 1¾" drill size. Send request on your company letterhead.

196

UNIVERSAL ENGINEERING CO. FRANKENMUTH 8, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 54

*Pioneered by Covel and first introduced at the 1947 Machine Tool Show. Available on all Covel surface grinders.



Save Re-scraping...Save Money! with COVEL HARD CHROME TABLE WAYS*

COVEL No. 10 SURFACE GRINDER

6"x18" Hand or Power Feed

Engineered to give you the most accurate gage, form tool and surface grinding performance at *low initial cost*. Smooth timing belt drive, hardened and ground lead screws and rigid vertical slide insure precision operation.

Hard Chrome Table Ways Reduce Maintenance Costs

This Covel introduced feature preserves the built-in accuracy of hand-scraped ways for extra years of precision service.

COVEL PRECISION GRINDERS
BENTON HARBOR, MICHIGAN

Write for FREE BULLETIN

For all the facts about the rugged low cost Covel No. 10 write DEPT. TP17

THE MOST COMPLETE LINE OF SURFACE GRINDERS • UNIVERSAL CUTTER & TOOL GRINDERS • DRILL GRINDERS • OPTICAL COMPARATORS

CIRCLE INFORM-A-GRAM KEY NO. 55

MANUFACTURING MEMOS

Name Changes . . .

● Swanson-Erie Corp. is the new name of Swanson Tool & Machine Products, Inc. of Erie, Pa. However, there has been no change in the company's organization, policies, services or products. The firm is a designer and builder of special purpose machines and is a pioneer in the field of standard indexing machine chassis for automatic processing and assembly operations.

● The Parker Stamp Works, Inc. has changed its name to The Parker-Hartford Corp. Included in the products manufactured by the company are marking tools, dies and machinery; molds and dies for the plastic and die casting industries and two and three dimensional cams for controls.

New Companies Formed . . .

● Hydair Cylinder Corp. has been organized with Jack Modrich as president. The company manufactures air cylinders with 1½" to 20" bores and hydraulic cylinders with 1½" to 12" bores designed for heavy-duty service.

● The formation of George Fry & Associates International, Ltd. has been disclosed by George Fry & Associates, a Chicago-New York-Los Angeles management consulting organization. The firm will provide world-wide management consulting services to Canadian, European, Middle Eastern and Far Eastern business and industry. Hans P. Treuenfels has joined the new corporation as vice president and general manager. Coordinating headquarters will be maintained in New York.

★ ★ ★

● Four of its railroad divisions have been united by American Brake Shoe Co. in a newly created Railroad Products Division with headquarters in New York. Included will be the railroad product facilities of the Brake Shoe & Castings, the National Bearings, the Ramapo Ajax and the Southern Wheel Divisions.

● Adolph O. Schaefer, president of Pencoyd Steel & Forge Corp., has announced that he and a group of associates have purchased the Fairmount Steel Corp. property and mills in Philadelphia. The company will make premium quality steel forgings.

● Fred C. Young of Ford Motor Co. has been awarded a Certificate of Appreciation by the Society of Automotive Engineers' Technical Board for his outstanding contribution to the work of the society's Iron and Steel Technical Committee.

William L. Rodich has been elected chairman of the Laminated Products Section of the National Electrical Manufacturer's Association. In addition, he has been appointed chairman of the Decorative Laminate Group's Technical Committee. Mr. Rodich is general manager of the Laminated Products Department of General Electric Co.

◆

Waterbury Farrell Foundry & Machine Co. has acquired the Sendzimir cold rolling interests of The Armzen Co. This acquisition will be known as the Sendzimir Mill Division with T. Sendzimir as manager, handling sales, engineering and servicing of cold sheet and strip mills. For the past 15 years, Waterbury Farrell has been manufacturing these rolling mills under license from The Armzen Co.

◆

The formation of A. O. Smith Engineering Service Corp. has been announced. Headquarters of the company which is a wholly owned subsidiary of A. O. Smith Corp., will be in Milwaukee. D. W. Sherman is serving as president of the new company which will provide supplemental engineering assistance to the engineering staffs of A. O. Smith's 12 operating divisions.

◆

Union Twist Drill Co. has purchased major controlling interest in R. Stock & Co., West Berlin, Germany, and its wholly owned subsidiary, Hartex Machine and Tool Works, also of West Berlin. The Stock company is one of the largest European manufacturers of twist drills and other metal-cutting tools. The Hartex-Division produces several varieties of precision grinding machines including centerless, cylindrical and internal types.

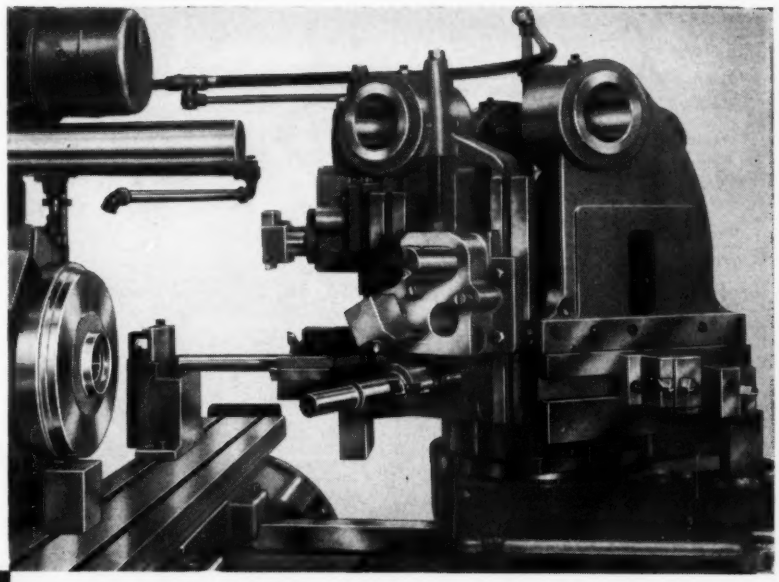
◆

Announcement has been made of the acquisition by Link-Belt Co. of Detroit Power Screwdriver Co., manufacturer of power-driven screwdrivers and related assembly equipment.

◆

Establishment of a warehouse in Indianapolis by Heppenstall Co. assures faster die block deliveries through a coast-to-coast network of local die block stocks in five industrial cities.

"SPADE WORK" *pays off . . .* *on a* POTTER & JOHNSTON 6DRE-40 AUTOMATIC with P&J-ENGINEERED TOOLING

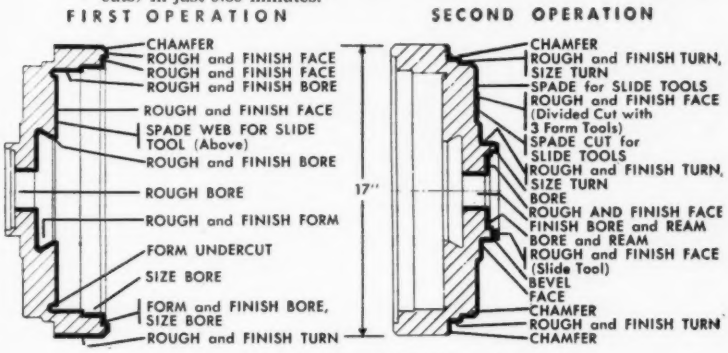


THE PROBLEM –

To machine this hard (288 Brinell) cast iron flywheel . . . requiring *48* close-tolerance cuts . . . quickly and economically.

THE SOLUTION –

Doing the job on a P&J 6DRE-40 Automatic Chucking Turret Lathe . . . with the extra power and rigidity it takes to use fast-cutting carbide tools with real efficiency. And doing the job with P&J-Engineered Tooling (see diagrams) . . . ingenious use of spade cuts followed by divided cuts with 2 or 3 slide tools operating simultaneously finished broad surfaces *fast!* First chucking (22 cuts) was finished in just 14.41 minutes . . . the second (26 cuts) in just 9.69 minutes!



HEAVY LINES INDICATE MACHINED SURFACES

Yes, in *this specific* job, "Spade Work" refers to the spade cuts used in the cost-cutting tooling set-up. But in addition, every time you put a hard-to-machine job on a P&J Automatic, you get the benefits of another, more important type of "spade work." This is the basic research and development engineering that has gone into every P&J Machine . . . gives it the ability to handle tough metals and complicated cuts with cost-saving speed and ease. And it's the engineering skill and experience that goes into P&J Tooling to insure the best possible combinations and sequences for minimum machining time. If you're interested in piling your profits higher, it's time to dig into the facts about a Potter & Johnston 6DRE-40. Write for Bulletin No. 159 or phone the Pratt & Whitney Office near you, and ask a Direct-Factory Representative to call and discuss your requirements. Potter & Johnston Company, Pawtucket, Rhode Island (Subsidiary of Pratt & Whitney Company, Inc.).

POTTER & JOHNSTON

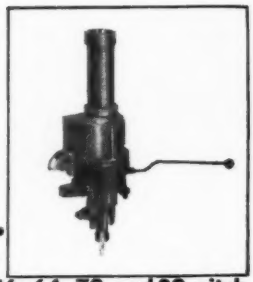
Precision Production Tooling for More Than Fifty Years

AUTOMATIC CHUCKING TURRET LATHES

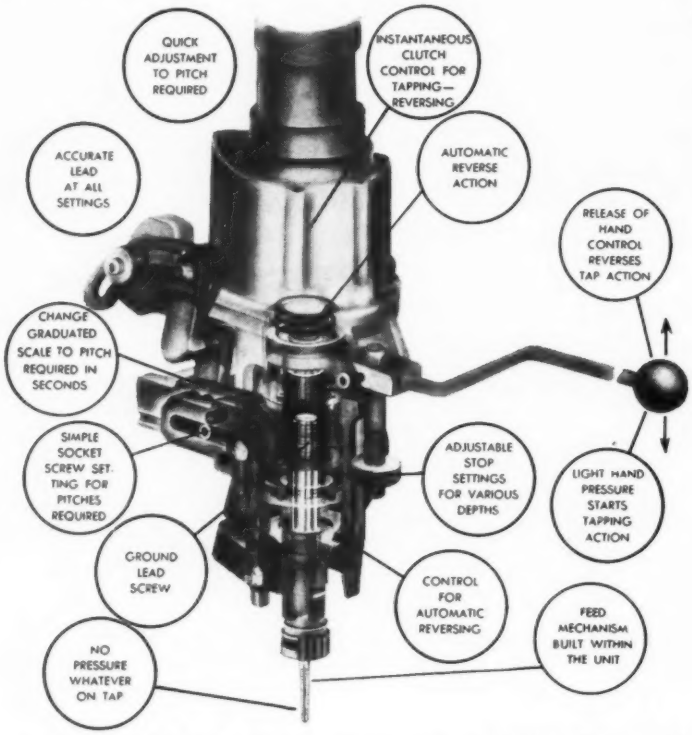
CIRCLE INFORM-A-GRAM KEY NO. 57

NEW Jarvis adjustable pitch LEAD SCREW TAPPER!

2 models. . .



Convertible to 11, 12, 13, 14, 16 18, 20, 24 and 28 pitch . . . 24, 28, 32, 36, 40, 44, 48, 56, 64, 72 and 80 pitch in SECONDS!


QUICK ADJUSTMENT TO PITCH REQUIRED
INSTANTANEOUS CLUTCH CONTROL FOR TAPPING—REVERSING
ACCURATE LEAD AT ALL SETTINGS
AUTOMATIC REVERSE ACTION
RELEASE OF HAND CONTROL REVERSES TAP ACTION
CHANGE GRADUATED SCALE TO PITCH REQUIRED IN SECONDS
SIMPLE SOCKET SCREW SETTING FOR PITCHES REQUIRED
ADJUSTABLE STOP SETTINGS FOR VARIOUS DEPTHS
LIGHT HAND PRESSURE STARTS TAPPING ACTION
GROUND LEAD SCREW
CONTROL FOR AUTOMATIC REVERSING
FEED MECHANISM BUILT WITHIN THE UNIT
NO PRESSURE WHATEVER ON TAP

Now, one attachment, one lead screw with quick simple adjustment gives convertible tapping in Seconds! Through positive leverage and clutch control, one lead screw running at constant speed, makes these new adjustable pitch lead screw tappers a must in every tapping department.

This is production economy—saves the cost of individual lead screws for each pitch desired. Saves change over time—converts in a few seconds—by adjustment of four set-screws along a clearly marked graduated scale.

Tap with a feather touch on hand control . . . no pressure on the tap. Stops cut at end of predetermined depth. Automatically reverses upon release of hand control, automatically backs out, leaving clean, accurate threads.

Now, convertible pitch tapping, faster production, new versatility is assured even by unskilled operators—with this tapping attachment.

WRITE NOW! Send for bulletin and prices.

Jarvis CORPORATION
POWER TOOLS FOR INDUSTRY
MIDDLETOWN, CONNECTICUT

CIRCLE INFORM-A-GRAM KEY NO. 58

"Commendable Comments"

"If the assembly is one subject to frequent change, it may not offer good potential for automatic assembly . . . the rate of increase in equipment cost as the ultimate in mechanization is reached is usually more rapid than the rate of manufacturing cost reduction."

—Glen R. Fitzgerald, director of the Process Development Section of General Motors Corporation at a meeting of the American Society of Mechanical Engineers in New York.

"Showing the public and government by precept and example that it is in the public interest to maintain a powerful, vital machine tool industry—an industry in being and not in mothballs, an industry given encouragement to grow and create, an industry to attract and hold the finest talent."

—Louis Polk, chairman and president, The Sheffield Corporation at a joint meeting of the American Society of Tool Engineers and the Society of Quality Control in Windsor, Ont., Canada.

"The economy of this country is based to a marked degree on obsolescence and, if we are to continue this process, we've got to make better products that will do more things; that have more eye appeal, through color, texture and form, than the products now being used. This can be accomplished only through the imaginative use of the wide varieties of materials and finishes that are available. Aluminum is in the forefront of these materials."

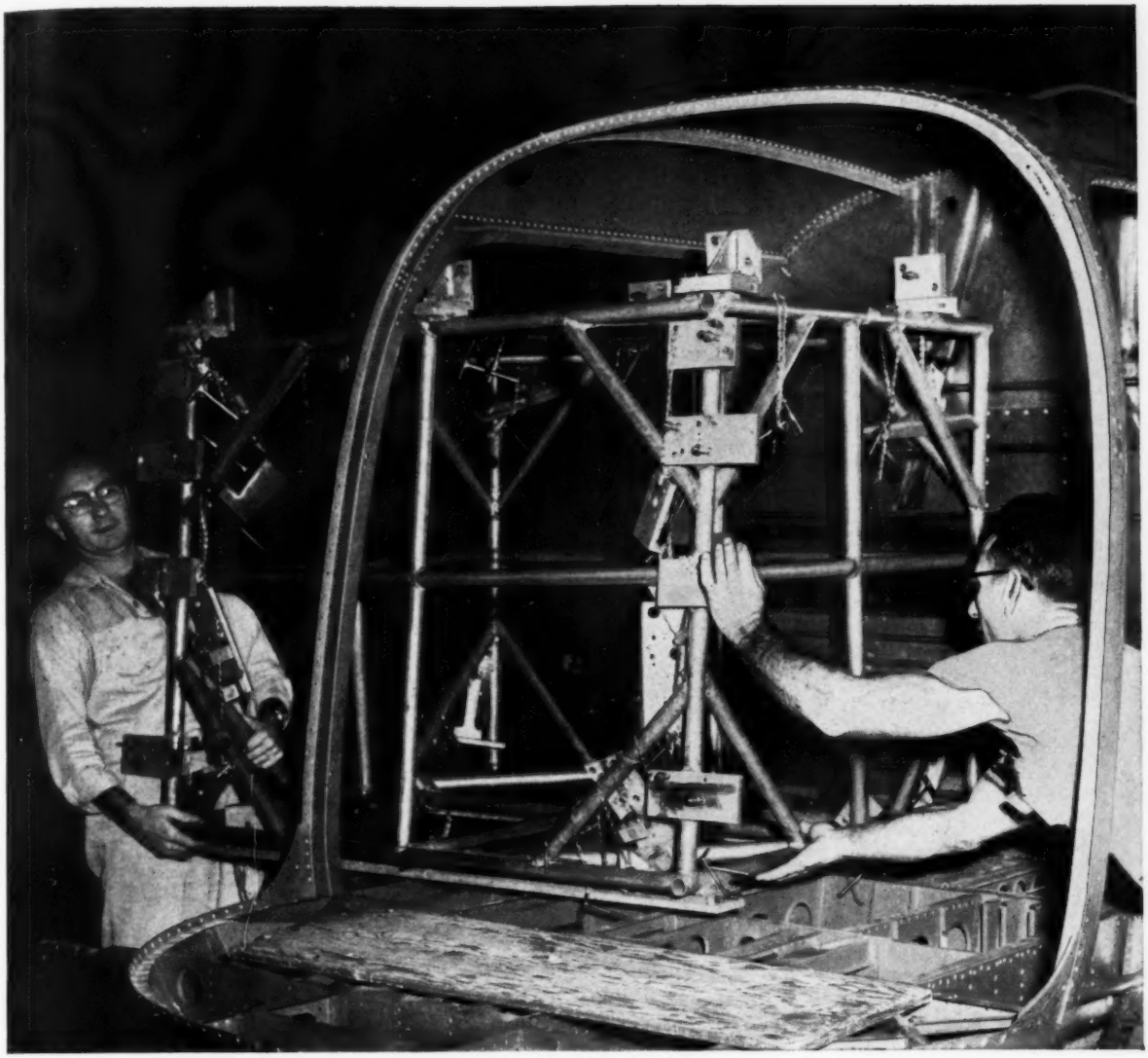
—F. J. Close, manager of market development, Aluminum Company of America at the Pacific Intermountain Conference of the Purchasing Agents' Association.

"Preventive maintenance has become of paramount importance in automotive production systems. Instead of maintaining machines, they are now required to maintain production. The difference is slight but fundamental. Teams of preventive maintenance men must be set up to cover only a specific production area. Also, the old central location for all maintenance work should be decentralized."

—Delmar S. Harder, executive vice president, basic manufacturing divisions, Ford Motor Company at the 55th Annual Meeting of the National Machine Tool Builders' Association in Chicago.

". . . in spite of this current personnel shortage, I think we can continue to increase our research output by increasing the efficiency of our research programs."

—Dr. Haldon A. Leedy, director of Armour Research Foundation of Illinois Institute of Technology at the First Annual National Industrial Research Conference in Chicago.



TWO MEN can easily maneuver this lightweight magnesium tool out of the cabin.

Magnesium for accuracy

"Lightweight tool helps precision-build Bell 'copters"

"Various parts and sub-assemblies of a helicopter cabin must be precision located in order to achieve accurate assembly results," says Mr. C. D. Riley, supervisor of standards in tool design, Bell Aircraft Corporation.

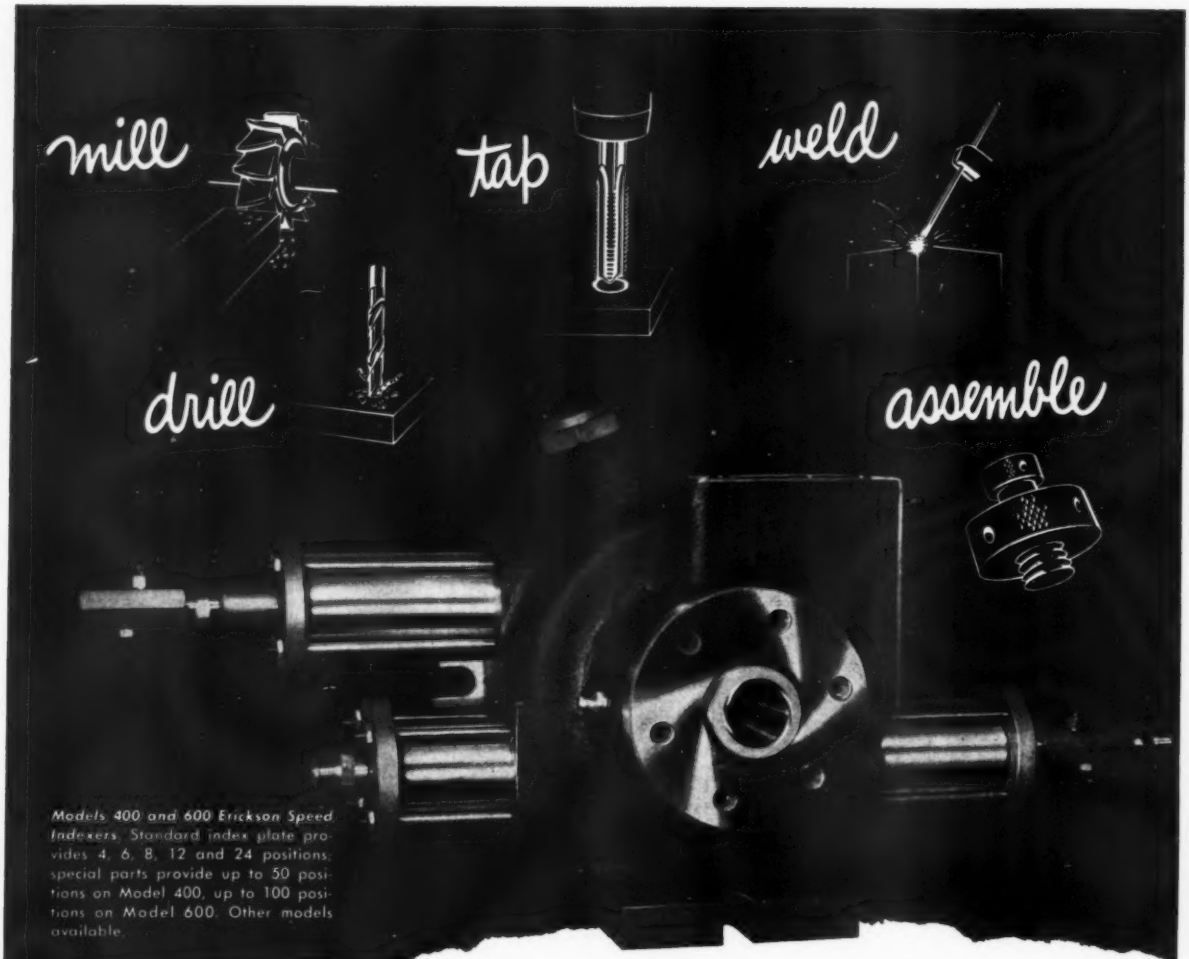
"To assure accuracy, we use a supporting tool frame to hold the various parts in position while being joined. So we built the supporting frame of magnesium. Weighing only 112.5 lbs., it meets our every requirement for accuracy.

"A steel or aluminum frame weighing as much as 300 or 400 lbs. would deflect the floor of the cabin beyond the allowable limits of plus or minus .010 inch at critical attach points resulting in poor fitting of doors, plexiglas bubble and other components." For information on weight-saving, readily welded magnesium tooling plate and extrusions, contact your nearest supplier of Dow Magnesium, or write THE DOW CHEMICAL COMPANY, Midland, Michigan, Dept. MA 1415W.

AVAILABLE FROM STOCK AT: Copper and Brass Sales, Inc., Detroit, Michigan • Fullerton Steel and Wire Co., Chicago, Ill. Hubbell Metals Inc., St. Louis, Mo. • A. R. Purdy Co., Inc., Lyndhurst, N. J. • Reliance Magnesium Co., Los Angeles, Calif. Vinson Steel and Aluminum Co., Dallas, Texas.

YOU CAN DEPEND ON DOW

CIRCLE INFORM-A-GRAM KEY NO. 59



Models 400 and 600 Erickson Speed Indexers. Standard index plate provides 4, 6, 8, 12 and 24 positions; special parts provide up to 50 positions on Model 400, up to 100 positions on Model 600. Other models available.

Angular accuracy within 2 minutes... repetitive accuracy in low "tenths" of a thousandth

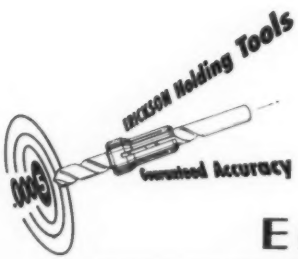
ERICKSON INDEXERS–

the economical way to smash automation bottlenecks

Even the most elaborate automatic production line can bog down *expensively* without rapid and accurate automatic parts positioning.

That's where Erickson Indexers really pay off. For you can interlock them into your production set-up with micro switches and solenoid valves. The hardened and ground lock pin operates in conjunction with the actuating mechanism to assure *positive positioning and angular accuracy within 2 minutes of a degree.* (Repetitive accuracy is no indication of angular accuracy. Erickson holds repetitive accuracy in low "tenths" of a thousandth.) And Erickson Indexers can maintain this great accuracy because their adjustable, self-contained shock control unit delivers a cushioned rotary load to the mechanism, thereby reducing wear.

Speed to keep lines moving . . . accuracy to reduce rejects . . . long life to cut maintenance and capital investment – all add up to Erickson Indexers, the *economical* way to smash automation bottlenecks.



Write for Erickson Catalog K today! You'll find many interesting applications for all Erickson holding tools. Take advantage of our free engineering service. An Erickson field engineer will gladly work with you for production economy.

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AA-2137

CIRCLE INFORM-A-GRAM KEY NO. 60

editorial :

A LOOK AT 1957

FOR YOUR FIRST 1957 TOOLING & PRODUCTION we asked top individuals in the machine tool industry for their opinions of business prospects for the year just getting under way.

From their statements, quoted in this issue, and from reading between the lines, many significant inferences can be drawn.

Although these statements come in a time of a dynamic expanding economy, high wages, great consumer demand, scarcities in the labor supply, and new technologies, you will note widespread recognition of, and concern for, the need of constantly waging the battle for reducing costs of production and for increasing the productivity per worker and/or machine.

This is a two-way street and applies to you, your competitor, and machine tool builder, alike. To attain the goals of reduced costs and increased productivity they, the machine tool builders, are in many instances engaged in plant expansions and modernization programs, in order to keep costs under control and to improve their delivery position. In his field, the machine tool builder faces just as rugged competition as you do in yours.

One of the most frequently mentioned factors in the 1957 picture is the increasingly tight money situation. Thus, in your modernization program more consideration should be given to the acquisition of capital goods through the many varieties of lease and/or rental plans. These, combined with accelerated depreciation write-offs, can go a long way toward strengthening your competitive position, cost-wise and sales-wise, in your own industry.

There is increasing recognition that automation setups must be more flexible — more amenable to engineering changes in product design. There have been too many instances of a relatively minor change in workpiece specifications necessitating a major revision of the work stations and between-station transfers of a highly automated line. Automation downtime can cost thousands of dollars per hour, taking days of operation to recover.

Also, to help you in attaining production economies, standard machine tools are becoming more versatile in performance by virtue of magnetic tape and punched card programming of repetitive operations. This means that lesser skills can be employed on intricate jobs, with greater uniformity and constancy in workpiece output, quality-wise and quantity-wise.

In general, the machine tool builders are predicating their 1957 prospects on the same basic factors that brighten your 1957 picture: the wants of our growing and more prosperous population for more goods and better goods. These wants range from household appliances to guided missiles, from bulldozers to hi-fi equipment, from automatic packaging machines to electronic toys, from paper staplers to super highways.

The success enjoyed by you and your competitors in turning out, at a profit, this wealth of goods, of such infinite variety, is all that the machine tool builder has to hang his hopes on. Your profits derive from the most modern machines, tools, and methods that you can apply to your production. His profits stem solely on his ability to furnish what you need when you need it.

L. C. Beatty, who heads up the Beatty Machine & Manufacturing Company, has wrapped it up nicely by telling us:

"When one considers that all business is aimed at filling the needs of the ultimate consumer, only an optimistic attitude can be taken toward 1957. The tremendous increase in population, coupled with the indications for continuing growth, will create business of all types. To these factors must be added the replacement business for existing equipment, the stimulus of new products and new methods, which will bring into being those things which today are dreams."

E. Willard Pennington

editor

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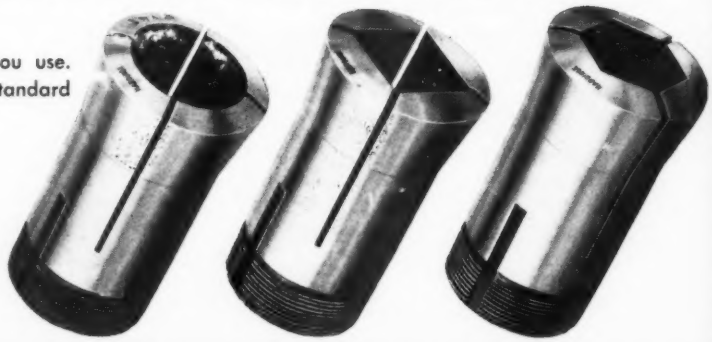
Maximum efficiency — Pay for only what you use. Records show that 82% of all sizes used are standard 16th sizes.

Buy only the sizes you use — Hardinge Collet stocks are available in Hartford, New York, Philadelphia, Baltimore, Rochester, Dayton, Detroit, Chicago, St. Louis, Minneapolis and Los Angeles. Also, Toronto and Montreal, Canada.



HARDINGE BROTHERS, INC., ELMIRA, N. Y. U.S.A.

CIRCLE INFORM-A-GRAM KEY NO. 6

A Booming Technology
Offers Exciting Profit-Building Possibilities

New Techniques in Coated Abrasive Machining Methods

by Dr. Hugh N. Dyer
Director of Product Testing
BEHR-MANNING CO.
Troy, New York

WITH THE DEVELOPMENT during the past 10 to 15 years of specialized machines designed to use coated abrasives to best advantage, and with the simultaneous improvements in the coated abrasive products themselves, there have been quite rapid advances in what we might call "Coated Abrasive Machining Methods". With increasing application of the coated abrasive machining methods, and increasing awareness of the potentialities of this new metalworking technique, a need has developed for practical guides to the selection of the right abrasives and the best conditions for performing various industrial metal cutting and metal finishing operations with maximum economy and efficiency.

Although the theory of metal cutting is not nearly so well-developed for coated abrasives as for single-point cutting tools, more and more data is being collected, and a number of very useful guides are available for selecting the product and the conditions for many grinding and polishing applications. Obviously it is impossible in a short article to discuss all of them in detail, but it is our purpose here to explain briefly some of the more important variables affecting the belt grinding process, and to show how they can be controlled to obtain the desired result.

Perhaps we should begin by defining a coated abrasive or sandpaper, as a product consisting of abrasive grains held firmly to a flexible backing support by an adhesive. Each of the three basic raw materials — backing support, adhesive, and abrasive — has an effect on the properties and the performance of the finished coated abrasive product, and each acts, to some extent at least, independently of the other two.

Coated abrasives are available in a great variety of sizes, shapes and forms, but we shall confine ourselves for the moment to endless belts . . . for simplicity and because the endless coated abrasive belt is one of the most versatile and widely used forms in the metalworking field.

Types of Backing Support

Some coated abrasive belts used for metalworking are coated on paper backings. Since the function of the backing is to support and retain the abrasive surface, it is obvious that a belt is only as durable and as rugged as the

backing support. While paper can be made quite strong in straight tension, it has poor tearing resistance and poor resistance to repeated bending and flexing, so that cloth backings are more durable and are preferred for most metal work except wide flat work such as sheet and strip finishing.

Two different types of cloth backings are available to provide products which are adaptable to a wide range of applications. The first is a heavy, strong, relatively stiff material, known as X-weight or drills cloth; and the second is a lighter, less strong, relatively soft and flexible material known as J-weight or jeans cloth. The heavier, stronger cloth is particularly adapted for use in coarse grit belts for heavy stock removal on straight or flat surfaces, where the prime consideration is stock removal and long belt life. The lighter, more flexible cloth is used for finishing and for blending or contour work on curved surfaces where finish and uniformity of the surface are more important than stock removal.

The coarse X-weight belt is typically used on a hard serrated-face contact wheel which maintains a small area of contact between abrasive belt and workpiece. This combination favors rapid stock removal at the expense of surface finish. The fine J-weight flexible belt, on the other hand, is used on a soft contact wheel which yields under pressure to conform to the workpiece and to increase the area of contact between it and the abrasive belt. This

COATED ABRASIVE MACHINE TOOLS

The growing industrial demand for faster and less costly metal removal methods has been taken advantage of by numerous machine tool builders during the past few years. These manufacturers have developed machines for using a coated abrasive in some one of its various forms as the cutting medium.

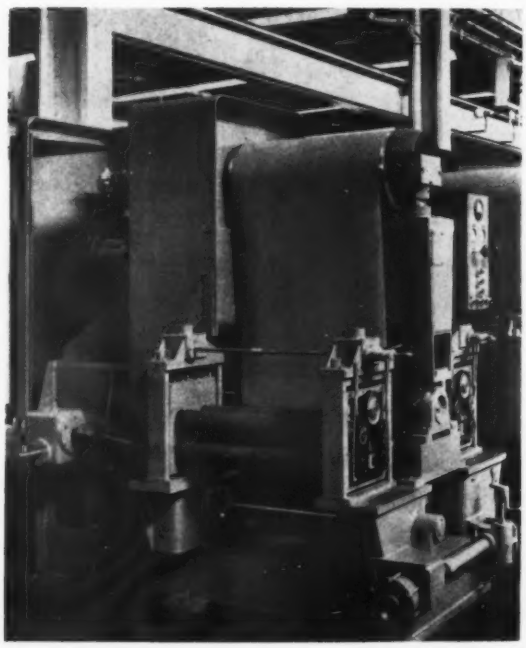
A wide variety of such machines were shown and demonstrated at the recent Second National Metalfinishing Show sponsored by Behr-Manning Co., a division of Norton Company.

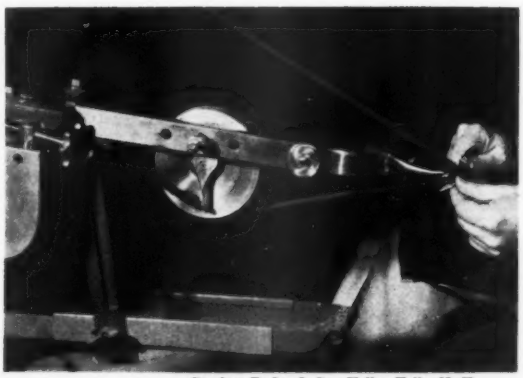
In a technology which is expanding rapidly, most of the machines, tools, and attachments exhibited had been developed within the past two years and many were shown for the first time.

The illustrations accompanying Mr. Dyer's article typify the diversity of machines exhibited and of operations they perform. They give positive evidence to the dynamic growth of a technology offering substantial savings to Industry today and boundless potential for tomorrow.

THE WIDESPREAD PRACTICAL APPLICATION OF COATED ABRASIVES . . . . . .

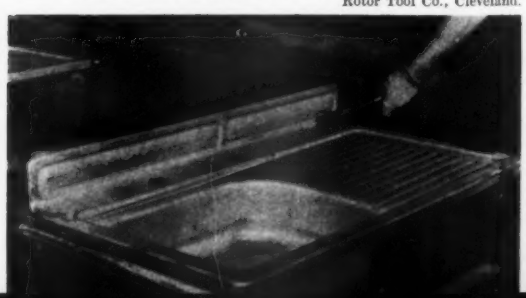
With guards and housings removed, this view shows one of the larger machines. It is the pinch-roll type abrasive belt grinding and polishing machine showing the drive from the gear box and rubber covered feed rolls. It will accommodate an abrasive belt 32" wide.
The Hill Acme Co., Cleveland.





Stephen Bader & Co., Valley Falls, N. Y.
This small ¾" belt grinder is used on the exacting work of polishing turbine blades for jet engines. Belt travels at 2800 sfpm. An endless fabric back-up belt allows the slight contouring necessary on the ball-bearing steel head.

Grinding a radius on the splash board of a steel kitchen sink and removing sharp edges and surface imperfections, using an electric horizontal grinder equipped with Behr-Manning Metalite cloth cone.
Rotor Tool Co., Cleveland.



combination favors good conformation of the abrasive belt to the shape of the workpiece, and gives good blending and uniform surface finish at the expense of stock removal.

The adhesive used to hold the abrasive grain to the surface of the belt also has a bearing on the performance of the abrasive belt. Two distinct types of adhesive are in use today, one based on animal glue and the other based on synthetic heat hardenable resins. The animal glue, because of its tendency to soften under the normal heat of grinding, tends to give a more uniform, less harsh finish, easily buffed out in the case of the fine grit sizes. The synthetic resin, because of its better heat resistance, has a tendency to stand up better under heavy stock removal in the coarser grit sizes. However, it gives a harsher, more scratchy finish in the finer grit sizes which is more difficult to buff out.

Types of Abrasive

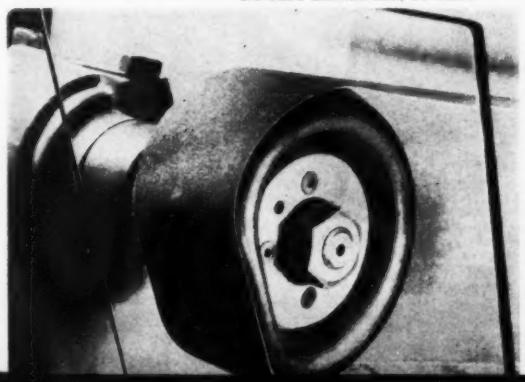
Selection of the proper abrasive for a given application depends not only on the selection of the grit size to give the desired stock removal and surface finish, but also on the correct selection of the abrasive material for the stock being ground. Two distinctly different abrasive materials are used for the great majority of industrial metalworking operations: aluminum oxide and silicon carbide. Both are pure, highly uniform, synthetic electric furnace products, and each has its special field of usefulness.

Aluminum oxide is a brown colored abrasive, less hard than silicon carbide, but with much greater durability when used on ferrous metals. In some flat sheet and strip polishing applications, particularly on stainless steel, fine grits of silicon carbide may be used for final polishing; otherwise, aluminum oxide is used for the majority of grinding and polishing operations on ferrous metals. Silicon carbide is a gray or black colored abrasive, one of the hardest known materials, and is used on most non-ferrous metals — aluminum, brass, bronze, magnesium, titanium, etc. — for both stock removal and finishing. Silicon carbide is also used for grinding such non-metallic materials as rubber, glass, leather, and plastics. It is probably unnecessary to say that both aluminum oxide and silicon carbide are available in a wide range of grit sizes, from very coarse to very fine, and that sometimes a sequence of two or more grit sizes is necessary in order to

. . . . . ALREADY AVAILABLE IN COUNTLESS COMBINATIONS . . . . . .

Air-powered vertical sander with a coated abrasive disc travels at 6,000 rpm to put a smooth finish on the narrow flange of a refrigerator part. A sponge rubber pad gives the disc the correct degree of flexible support.

Buckeye Tools Corp., Dayton, Ohio.



Here a sheet of glass is being pressed against an abrasive belt running over an Aircore grinding wheel inflated to a pressure of only 3 psi, showing how pressure of the workpiece increases the abrasive contact area. The wheel allows the belt to shape itself to the contour of the work.

Nu-Matic Grinders Inc., Cleveland.

This 3-ton centerless grinder, 10' long, handles bar and tube stock up to 4" dia with power driven fixtures. Coated abrasive belts serve as both grinding and feeding media.

Production Machine Co., Greenfield, Mass.

meet the requirements of a particular application for both stock removal and finish.

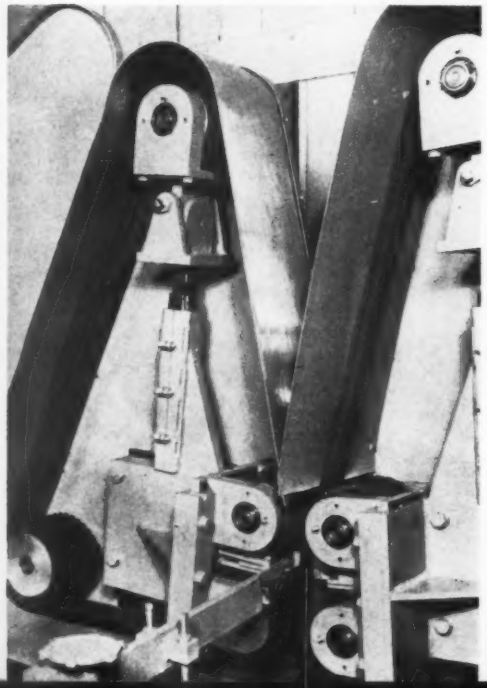
In addition to the variables controlled by the coated abrasive manufacturer that affect belt performance, there are a number of other variables, subject to the control of the user, that can have a decided effect on the grinding operation. Proper choice of such factors as contact wheel, belt speed, and grinding fluid can mean the difference between success and failure for many belt applications.

Variables the User Controls

Today there is available a wide variety of contact wheels made of metal, plastics, leather, rubber, fabric, felt, etc. These wheels come in a range of face patterns and face densities. Because of the wide range of wheels available, and because of the ease of changing contact wheels, choice of the correct contact wheel for a given application is one of the simplest and best ways to insure a successful and economical process. The basic principle of correct contact wheel selection is that a hard wheel should be selected for effective stock removal, while a soft wheel should be selected for best finish. A relatively hard wheel can be made more aggressive by serrating or cutting a pattern in the face of the wheel. This device is quite effective, but should not be used indiscriminately on very hard wheels because the increased aggressiveness of the contact wheel may result in very rapid stock removal for a short time but poor belt life because of too rapid shedding or loss of grain from the belt itself. With very aggressive wheels a resin bond belt should always be used for maximum durability.

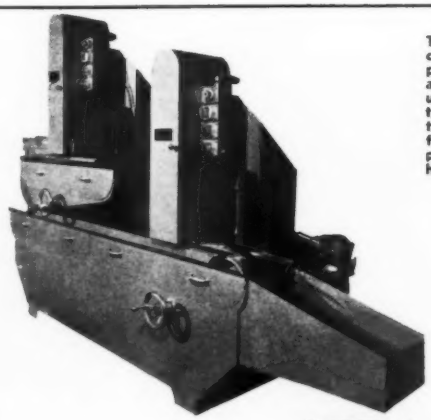
The importance of belt speed as a factor affecting the efficiency of belt grinding operations is not generally appreciated. In the grinding of ferrous metals, low belt speeds tend to increase rates of cut and to reduce belt life by promoting shedding or breakdown of the coating, while higher speeds have a tendency to improve finish and to cause belts to fail by dulling and glazing rather than by shedding. Thus low speeds are more effective for rapid stock removal and high speeds are more effective for producing the best finishes. Normally, low speeds recommended for most metalworking operations are in the range of 3500 to 5000 fpm, while high speeds are those in the range of 6000 to 8000 fpm. Only for a few special applications such as grinding

. . . . . IS BEING IMPLEMENTED BY A GREAT SURGE OF DEVELOPMENT WORK . . . . .



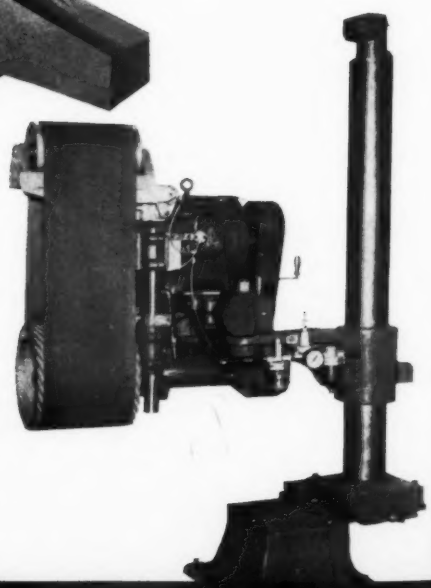
This unusual twin-belt polisher uses opposed abrasive belts and automatic work traverse to finish the two-way taper on silver flatware, finishing both sides simultaneously.

Nicholas Equipment Co., Bellevue, Ohio.



This Over-and-Under machine can polish both sides of a workpiece (sequentially) in one operation. Workpiece first passes under grinding head at left, then is carried around to bottom conveyor belt. Unground face is now up, positioned for passage under second grinding head at right.

Engelberg Huller Co., Inc. Syracuse, N. Y.



A 12" special belt head, incorporating air tensioning and an automatic abrasive belt tracking unit, may be used efficiently on any straight-line, rotary, or return type automatic setup.

Acme Manufacturing Co., Detroit.

titanium are speeds as low as 1500 to 2500 fpm recommended.

How Grinding Fluids Affect Performance

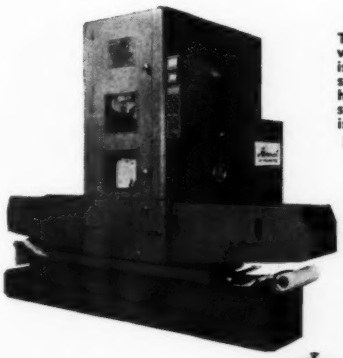
Lubricants, greases, and grinding fluids in general can play a very important part in the belt grinding process. It has been found that certain grinding fluids can affect the surface finish obtained, the rate of stock removal, and the belt life. Some of these grinding fluids serve primarily as coolants and flushing agents to remove heat from the workpiece and to flush away grinding chips. This is typical of the behavior of water and mixtures of water with most soluble oils and rust inhibitors.

Other grinding fluids actually react chemically with the workpiece or the abrasive grain or both, and through this chemical interaction are able to have an important effect on the rate of breakdown of the abrasive grain, the rate of stock removal, or the tendency for the belt to fill up or load with grinding chips. An example is the use of certain chemically active oils when grinding stainless steels of the 300 series. In some applications, the use of the proper grinding oil can increase the amount of stock removed per belt by 20 times or more.

Still other grinding fluids are used primarily as physical aids in obtaining improved surface finishes and improved belt life in certain finishing operations particularly on soft metals. An example is the use of grease on a fine-grit belt to improve surface finish and prevent loading of the belt in the polishing of aluminum or steel. One type is a hard, high-melting grease which builds up between the abrasive grains and prevents them from penetrating the work deeply and causing scratches. This grease prevents loading of the belt and produces the best surface finish. Another type is a softer, lower melting grease which leaves more abrasive grain exposed. This grease also prevents loading of the belt, but produces somewhat poorer surface finish and greater cut. When no grease is used, the belt may rapidly fill up with metal chips and stop cutting altogether.

The user of coated abrasives will get maximum satisfaction only when the most suitable product specification is selected, and when the product is used on properly designed equipment under the best operating conditions with respect to support, operating speed, and type of grinding fluid or lubricant used.

. . . . . ON MACHINES, TOOLING, AND LUBRICANTS DESIGNED SPECIFICALLY . . . . .



This machine was designed for wet abrasive belt grinding, polishing, and deburring of flat stock up to 12" wide and 6" high. A variable speed, air-tensioned endless conveyor furnishes continuous workfeed.
Hammond Machinery Builders, Inc., Kalamazoo, Mich.

A heavy-duty semi-automatic oscillating unit designed to polish out-of-round parts, though it may be locked in position to handle cylindrical work. Shown here with a buffing wheel, it is also used with wearable coated abrasive wheels.
Acme Manufacturing Co., Detroit.

At top, an abrasive sleeve is slipped over a slotted rubber wheel. With air power applied, below, the wheel expands, gripping the sleeve solidly.
Chicago Rubber Co., Inc., Waukegan, Ill.

In addition to the machines and tools illustrated here, many others have been developed for the application of coated abrasive machining. Among these are the following products, all of which were exhibited at the Behr-Manning recent National Metalfinishing Show.

Portable air-powered tools, by Aro Equipment Corporation, Bryan, Ohio; portable sanders, by Black & Decker Mfg. Co., Towson, Md.; portable belt and disc sanders, by Buckeye Tools Corp., Dayton, Ohio; portable disc grinders and polishers, by Chicago Pneumatic Tool Co., New York, N. Y.;

Portable jitterbug sanders, and dual action easy sanders, by Detroit Surfacing Machine Co., Detroit; portable abrasive belt unit, swing frame grinder, abrasive belt grinder, and spindle stand (powered), by Grinding & Polishing Machinery Corp., Indianapolis, Ind.;

Portable belt, pad, and disc sanders, by Porter-Cable Machine Co., Syracuse, N. Y.; portable straight-line and orbital sanders, by Sundstrand Machine Tool Co., Rockford, Ill.; portable air tools, featuring vertical and right-angle disc sanders and grinders, by Rotor Tool Co., Cleveland; portable pneumatic and electric tools, by Skill Corporation, Chicago.

Centerless grinding and finishing machine (light duty), duplex heavy duty centerless polishing and finishing machine, and twin belt surfacing machine, by Production Machine Co., Greenfield, Mass.; abrasive belt grinder with belt in either horizontal or vertical position, bench grinder, variable speed, 2-spindle polishing lathe, vertical-horizontal grinder for polishing and deburring operations, belt grinder-polisher with built-in dust collector, grinder for light-duty dry belt deburring, and head with abrasive belt conversion unit, by Hammond Machinery Builders, Kalamazoo, Mich.

Universal arm grinder, by Abrasive Machinery, Inc., Oneida, N. Y.; air-operated oscillating head, by Acme Manufacturing Co., Detroit; contact wheel belt grinder, by B. & E. Mfg. Co., Inc., Kansas City, Mo.; space saver for off-hand roughing and polishing contoured parts, by Stephen Bader & Co., Valley Falls, N. Y.; yoke sander for small off-hand applications, by Bush Manufacturing Co., Clawson, Mich.;

Four-head conveyor-type belt grinder, and vertical platen grinder, by Engleberg-Huller Co., Syracuse, N. Y.; back-stand idler, by Fenlind Engineering Co., Rockford, Ill.; contact wheels and lubricants, by Formax Manufacturing Corp., Detroit; bandsander, by Mead Specialties Co., Chicago; Grind-O-Flex wheels, by Merit Products, Inc., Culver City, Calif.

Extruded shape polishing machine, by Murray-Way Corporation, Birmingham, Mich.; inside edge grinder, by Oliver Machinery Co., Grand Rapids, Mich.; grinding, polishing, and deburring machine, abrasive belt finishing machine, and abrasive disc finishing machine, by Rockwell Manufacturing Co., Delta Power Tool Div., Pittsburg, Penn.

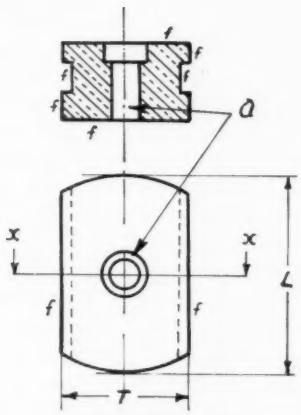
. . . . . TO ADVANCE THIS YOUNG TECHNOLOGICAL GIANT.

Bush Manufacturing Co., Clawson, Mich.

The new swing sander, which permits the contact wheel to be raised or lowered, swung from side to side, or moved forward and backward, is shown cleaning up tight radii in an automobile wheel.

Hammond Machinery Builders, Inc.

This Hammond rotary automatic setup involves the use of a rotary turret around which is placed a variety of buffing and polishing heads. The abrasive belt conversion unit utilizes belts up to 4" wide x 120" long. The belt unit is air tensioned and may be set at any angle around a 120° arc.



Component X

Drill Jig Automatically Centers Workpieces of Different Sizes

by W. M. Halliday
Southport, England

WE REGULARLY HAD LARGE quantities of sand-cast bronze bearing blocks of the kind shown as "Component X" in which to machine the counterbored hole "a". This operation entailed considerable objections of the following character.

Each rectangular casting was first milled to close tolerances on all flat sides marked "f". The two opposed curved ends, however, had to be left rough exactly as cast. The bearing castings were produced in a range of three different lengths L, i.e. 5", 5½", and 6", respectively. All the blocks throughout this range were machined to exactly the same width and thickness T. Hole "a", of the same sizes in every case, had to be situated centrally in respect to dimension T to a fine tolerance, and also located centrally to the respective length dimensions L to limits of ±0.005".

The difficulties arose in connection with locating such different sized castings in a single jig for drilling hole "a". Dimension L in all of the three sizes of block varied a considerable amount because of the rough as-cast condition of the curved ends. Such variations greatly exceeded the tolerance specified in respect to the centralization of the hole across dimension L.

It was found impracticable to position the workpieces accurately, quickly or reliably in a conventional type of drill jig fitted with the usual fixed locator pins or integral raised surfaces which would bear against the rough curved ends of the component to determine its correct endwise setting. With these customary forms of work location, many of the castings could not be inserted between the pins around the drilling site in the jig. Others dropped easily therein but with an undue amount of end play which proved inimical to accurate setting. Only a relatively small proportion of the castings fitted snugly between the locator pins to permit hole "a" being exactly centered central along the length dimension L.

It was also found difficult to design a simple drill jig having fixed pin locators which would accommodate all three different lengths of castings encountered.

These difficulties were successfully overcome

Here is a fast-working drill jig that rigidly holds and accurately positions workpieces of varying lengths. The single clamping screw serves to lock, release and automatically center the work.

by means of the drilling fixture of the design shown in Figure 1. Its construction consists of the following simple working elements.

The rectangular cast iron base plate A is machined all over, and ground on top and bottom sides to insure parallelism.

Four holes B, one in each corner serve to hold the fixture on the machine table in the usual manner. A short rectangular slot C is machined completely through the base plate, central to the width and located near the left end as shown. The long sides of the slot are parallel with each other and also with the corresponding longest outside edges of the fixture. The steel slider block D, hardened and ground, has a substantial rectangular tongue machined on its underside; this tongue being ground to slide closely along slot C. The upper large portion of the slider block rides on the top of the base plate.

A case-hardened steel keeper plate E is secured by screws F to the bottom of the slider tongue to hold the latter in correct working position within slot C. The keeper is situated freely within the side but shallow slot G cut along the underside of the base plate and centered with the narrower slot C. This insures that the keeper will clear the top of the machine table when the fixture is fastened thereto.

The slider block, thus fitted, should move smoothly along slot C with a minimum amount of sideplay or lift. It is actuated in its sliding movements by the screw H. The right hand end of the latter is reduced in diameter and is left plain for bearing easily within a hole bored in the slider block. The integral collar of the screw bears against the left side of the block. An annular half-round groove is machined around the plain shank of the screw, and fitting closely therein is the hardened steel pin J, driven tightly through the slider. By this means the screw is free to rotate within the slider block but it is restrained in its endwise position.

The screw H threads easily through the stationary block K which is fastened near the left end of the base plate by screws L. A handwheel or a crank may be fitted to the extended left end of the screw for operating purposes.

A large 90° vee I is machined across the right hand end of the slider, such opening being large enough to accommodate the longest of the three sizes of castings X. The latter, shown in heavy broken lines, rests upon the top of the base plate and is straddled over its length L by the sides of the vee I as shown.

A hardened steel block M having a long threaded stud on its underside is screwed down permanently, in the position indicated, to the top of the base plate. This is situated approximately central with the vee opening in the adjacent slider block. Its left side forms a bearing face against which workpiece X abuts to locate it correctly in cross-wise relationship.

The corners at the right side of block M are beveled off at 45° to provide working clearance of the swinging locator arms N. These latter are identical in size and shape and pivot freely upon the stationary shoulder stud O screwed into the top of the base plate. This stud is situated on the same longitudinal centre line as the vee opening I in the slider block D. The height of the arms is only slightly less than that of the workpiece X resting on the top of the base plate. The arms have a certain amount of swing in the horizontal plane so as to straddle X over its length as do the sides of the vee in the slider block at the opposite side.

A powerful compression spring P is housed within a blind hole drilled in the right side of each arm N. The other end of each spring resides in a blind hole drilled in matching fashion in the blocks Q. These, in each case, are secured by screws R within a shallow diagonal slot S machined across the top of the base plate near its right end. The springs should be identical in size and compression rating so that the same force is imparted to each arm. The purpose of the springs is to force the arms inwards against the as-cast curved ends of workpiece X exactly as illustrated in the lower plan diagram.

The steel arm T swings upon fulcrum pin U carried in the slotted cheeks of bracket V which is fastened to the top rear side of the base plate by screws W. The arm is closely fitted within the slot in bracket V to ensure correct guidance. A simple stop (not shown) is provided to locate the arm in its horizontal position, at which setting it stands about ⅛" clear of the top of workpiece X located on the jig site in readiness for drilling. A standard hardened drill bushing Y is secured in the forward end of the arm. This bushing is situated exactly on the longitudinal center axis of the vee opening I in the slider block and at a distance equal to half dimension T from the left-hand face of stationary block M.

The arm is swung into the horizontal position for drilling hole "a" in the component. It is then raised to the vertical position, or slightly beyond, to allow the counterboring tool to be inserted in the work. A clearance hole is provided in the baseplate in line with the bore of the drill bushing to afford proper clearance for the drill as it breaks through "a".

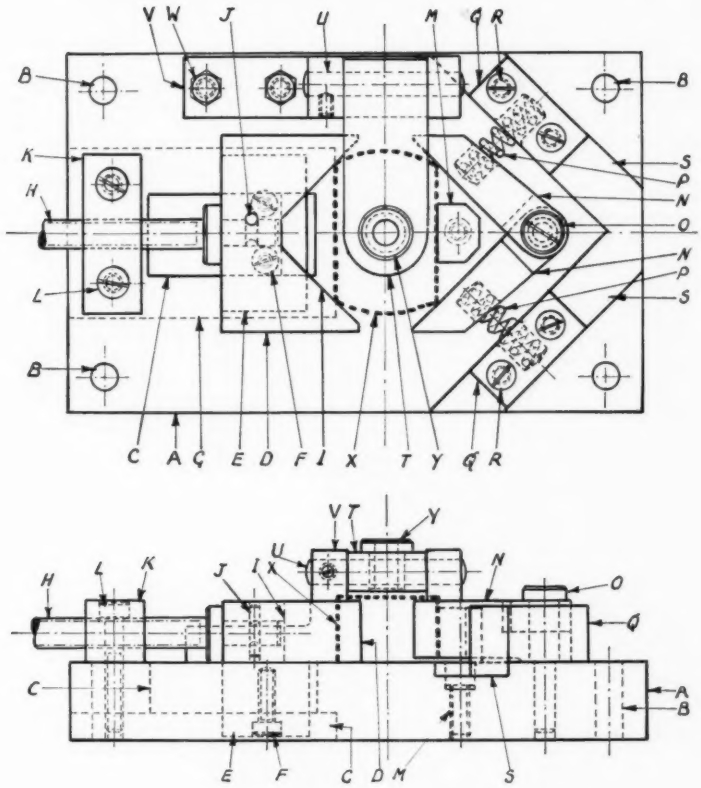


Fig. 1. Automatic centering of the workpiece X is effected by the combined action of the sliding vee I and the spring loaded vee arms N. The basic design features of the jig can be applied to other jigs and fixtures that must hold symmetrical but unequal sized workpieces.

To load workpiece X in place, arm T is raised to the vertical clearance position. Screw H is operated to retract slider block D leftwards a small amount. Arms N will have closed inwards to the point where they are arrested by the 45° flats on the right side of block M. The workpiece is then placed on top of the base plate adjacent to stop block M, and is then pushed rightwards to bring each curved end to bear smartly against the inner side of an arm N. The sides of vee I in the sliding member similarly bear against the curved ends at the opposite side of the workpiece. Screw H is next turned to move the slider to the right. This action forces the work against fixed stop M thus bringing it into correct centralized location, in the longitudinal direction, with the bushing Y. As this closing movement takes place and workpiece X slides to the right, arms N open outwardly a corresponding amount, but they move equal amounts each side of the horizontal center axis of vee I, and maintain tight contact with the curved ends of the workpiece. Since the spring pressure is the same on each arm the members thus hold the work always central in the cross-wise direction, regardless of the variations in dimension L.

Figure 1 shows a workpiece located in the proper manner for drilling hole "a". It will be understood that the requisite gripping pressure is applied to the work by the slider D pressing it forcibly against stationary block M.

This type of drill jig therefore automatically centralizes the workpieces in both directions regardless of variations occurring in the lengths, and/or any roughness on the unmachined curved ends. Its application proved far more satisfactory, economical and accurate than a conventional type of jig which had to be adjusted frequently to make the fixed locator pins suit different lengths of workpieces. The following practical advantages possessed by this unusual improved design are worthy of note.

The workpieces are automatically centered on the drilling site notwithstanding any variation in their overall length or unevenness of the as-cast curved ends.

Centralization takes place by the mere act of clamping the workpiece in the jig.

One lever or handwheel is sufficient to obtain such centralization and gripping features.

A powerful gripping pressure is obtained on the work.

The applied clamping pressure does not induce any lifting or tilting of the workpiece. The latter remains firmly seated on the base plate, thus drilled holes "a" are maintained perfectly square to the machined surfaces of the part.

end

1957's Machine Tool Outlook

You, Mr. T & P Reader, and your competitors constitute the machine tool builders' market. Bear in mind, as you read these statements of machine tool industry leaders, that they recognize your problems — that they realize their success depends upon your success.

They know that they have to give you the standard and special machines you want, built the way you want them, with simplicity of operation and ease of maintenance. Design trends and technical advances have stemmed from your expressed needs.

To stay in business the machine tool builder must satisfy your wants. He knows that for you to meet competition in your own field you (and your competitors) must have a continuing modernization program. And he knows full well that he, in turn, faces rugged competition for your favor.

—E.W.P.

We are accustomed to thinking of American industry as very efficient. Actually, this is not strictly the case because very few machine tools in use today anywhere near equal the performance of which the current models of the same machines are capable. Far from it, in fact. Recent surveys show that the number of machine tools now over 10 years old has increased from 55 per cent to over 60 per cent in the last three years. Those over 20 years old have increased to 20 per cent — in other words, to one machine in every five now in service. The Machine Tool Show of 1955 set new standards as to what constitutes a production machine. Conservatively it rendered obsolete overnight a million machine tools in use in American industry. As a result, machine tool builders have been unusually busy ever since and will continue so indefinitely. Altogether the outlook for uninterrupted good business for some time to come was never better for U. S. machine tool builders than right now. Interest by small as well as large industrial concerns in programs of plant expansion as well as equipment modernization continues unabated. So great, in fact, is the pressure for speedier deliveries of many types of machine tools that expansion of production facilities by some machine tool builders themselves is already underway or contemplated for early in the new year.

JEROME A. RATERMAN, President
National Machine Tool Builders' Association
President
The Monarch Machine Tool Co.

Domestic outlook for machine tools looks good for most of 1957. Plant modernization and new equipment will be needed to overcome competitive and growth conditions by providing new and better quality products and reducing costs through greater productivity. The anticipated increased demand for automobiles and household appliances should result in greater use for automated and related types of production tools and equipment. Greater emphasis will be placed on aircraft and guided missile programs due to the international situation. Constructed activity should continue on high level.

C. T. APPLETON, Vice President
Reed Rolled Thread Die Co.

The impact of automated production lines has pushed the design effort of machine tool builders nearer full-time optimum efficiency in machining. Additional gains can still be made with machines built for greater rigidity and strengthened construction to accept the higher speeds and feeds made possible by automatic loading or unloading and new cutting tool materials. A prime trend in metalworking is the displacement of metal rather than its removal. This cold forming operation not only eliminates the wasteful production of useless chips with an attendant reduction in cost but it also makes for a better product. Development in this area is intensive and it seems likely that in the near future gear rolling machines will be used as extensively as gear cutters are now.

MARVIN R. ANDERSON, President
Michigan Tool Company

What's ahead for '57 in machine tool domestic sales? An optimistic viewpoint is certainly in order. Although the rate of domestic expansion has decreased somewhat this may be offset by new budgets under consideration. Certainly the impact of technical progress, automation, and the constant search for more efficient operations will result in many replacement programs. Proper coordination of machine tool shows, trade advertising and just plain aggressive selling will surely prove 1957 as active as last year, possibly better.

GEORGE BANKO, President
The Cleveland Grinding Machine Co.

The year 1955 was considered a good year for our industry and advance information on the current year indicates that 1956 will be equally as good if not better. Our own company will look back on the past twelve months as one of the best periods of our 93 years' experience in the mechanical press business. It appears that the present favorable conditions will extend at least through the early part of the coming year and that 1957 may even surpass previous records.

GEORGE E. BASS, President
Ferracute Machine Company

When one considers that all business is aimed at filling the needs of the ultimate consumer, only an optimistic attitude can be taken toward 1957. The tremendous increase in population, coupled with the indications for continuing growth will create business of all types. To these factors must be added the replacement business for existing equipment, the stimulus of new products and new methods, which will bring into being, those things which today are dreams. The 1957 Machine Tool Industry will be without question, a major part of this growing economy.

L. C. BEATTY, President
Beatty Machine & Manufacturing Co.

The economic development of our country requires the product of a healthy, stable, machine tool industry. Our industry is now a growth industry rather than one of feast-or-famine. There certainly will be some dips, but the pattern should be one of steady growth. The machine tool business should be good in 1957 particularly in the first half. It does not appear that there will be as many large programs as there were in 1956, but the volume should be maintained by the sale of more individual tools. Research and development of new and better ways to machine parts faster and

more accurately will play an important part in where the orders are placed. It is going to require greater effort in sales and advertising, but with this effort 1957 should be another good year.

H. G. BIXBY, President
Ex-Cell-O Corporation

It is beginning to appear that 1957 will be the biggest peacetime year in our history. We find special production machinery to be in active demand, especially automated equipment for the automotive industry and we are more than pleased at the receptive attitude accorded new ideas and cost saving equipment. We find our foreign export business holding up very well in spite of competition from the European countries who are quoting very low prices due to their low labor costs and due to the fact that they have copied our machines without the resultant high cost of experimental and development work.

C. BINTZ, Div. Pres. & Gen. Mgr.
Wickes Machine Tool Division

Sustained defense requirements, coupled with a probable increase in gross national product should assure continued satisfactory volume for the machine tool industry during the first six months of 1957. The outlook for the second half-year will depend to a large extent upon whether 1957 proves, as predicted, to be another big automotive year. Exports of "elephant machines" and mass production equipment should show some improvement. The outlook for the export of basic machine tools of standard type is drab, to say the least, due to exchange restrictions and what amounts to import embargoes imposed by most of the Western European nations. Import competition will continue to be felt, but should not have serious impact on domestic sales volume.

FREDERICK S. BLACKALL, JR.
President & Treasurer
The Taft-Peirce Manufacturing Company

Trying to predict the machine tool outlook for 1957, the domestic and export potentials look good for our segment of the industry, namely, gear hobbing machines, spline rolling and thread producing equipment. The export market on particularly general tools, as contrasted with specialized machines, may encounter stiffening competition from overseas builders. The machines which were displayed in London last July showed remarkable overall improvements. Also incorporated were many appealing little niceties of design and finish which give some machine tools that edge in overall appearance. One of the outstanding developments presented was the cold rolling of splines by the Grob process.

JOHN A. BRADNER, President
The Lees-Bradner Company

Although there are indications that the current "hard money" situation is exerting some influence on capital expenditure, our operations, and potential markets for 1957 are very promising. Also, while automation has almost become a backneyed definition of low production costs, it must be recognized that it is only the logical coordination of many "standard" techniques, known and developed over a long period of time. For countless activities in metalworking, full automation cannot be justified economically, and therefore the field for versatile, high quality, standard machine tools will provide the back-bone for the major part of our new and replacement business.

R. C. BOSCH, President
Western Machine Tool Works

I believe: the 1957 demand for machine tools will be even better than 1956. Recent events insure an increased requirement for military material. The projected shipbuilding program will be enlarged. The colossal roadbuilding program will be telescoped into a shorter period than presently contemplated. Money, goods and manpower will be short. We now have forces producing a steady built-in inflation. Federal Reserve controls affect too small a part of money supply to be effective. The optimistic statements regarding increases in rates of productivity should be discounted. We will find it increasingly difficult in 1957 to maintain normal profit margins.

WILLIAM J. BRYANT, President
Bryant Chucking Grinder Company

1957 production requirements are expected to be near capacity. Commercial and defense demands alike are high. Export volume is negligible. Import competition growing. Modernization is practically demanded by users and compelled by competition. Continued interest because of the 1955 Tool Show is difficult to judge since buyers' interests have varied during the intervening months. Programming machine operations attracts much interest but shows economy justifying investment chiefly in defense production work and high production requirements in industries like automotive. Backlog is high and deliveries are long.

R. D. BRIZZOLARA, Vice President
American Steel Foundries

With no relief in the tight money market in sight for well into 1957, the net current assets on a balance sheet will get a much closer look by bankers when approached for credit. For this reason, acquisition of machine tools by the lease method will take on greater importance than ever, in order to keep the current ratio as favorable as possible. This will be of particular significance to those progressive manufacturers who want the economy of modern machine tools, without changing liquid assets into fixed.

WALLACE E. CARROLL, President
American Gage & Machine Co.

1957 should be another good year for the machine tool industry because of large year-end backlogs and the millions of dollars already appropriated for capital goods purchases. Demand for highly productive and specialized tools should exceed that for more standard types in keeping with the changing designs of the products they make. Our multiple-spindle automatic bar and chucking machines serve this field and our present backlogs should support operations at the current rate well into the last half of 1957. Keener import competition will be felt on general purpose machines although export potential will remain high because of new designs displayed at the 1955 Show and developed thereafter, providing greater automaticity. Our shipments abroad have trebled in the past three years and in 1957 they should exceed 20% of our total production.

F. H. CHAPIN
President and Chairman of the Board
The National Acme Company

Automatic operation and controls will continue to be the dominant goals in the design of machine tools. However, as a result of experiences gained on the production line there will be a growing demand for a more standard unit construction in machine tools. Aim is to make the automated line more flexible. With equipment now in use, a small change in product (workpiece) design or processing methods often means an equipment change-over at an almost prohibitive cost. The automated machine of the future must be simple to adjust, maintain, alter or replace . . . as parts design and processing methods may dictate.

KIRKE W. CONNOR, President
Micromatic Hone Corporation

Based on all the forecasts and information available, anyone would be pessimistic indeed not to predict another good year for the Machine Tool Industry in 1957. The aircraft industry is our immediate hope for large machine tool requirements. This need should continue well into 1958. We will have a good automotive year, if gas rationing is not enforced. The farm equipment industry and earth moving industry, with their road-building programs will keep the machine tool builder happy. We do not expect any increase in our export business the coming year.

J. P. CROSBY, Vice President-Sales
The Lapointe Machine Tool Company

In my opinion, the machine tool outlook for 1957 is good. From all indications, general business will be good which means that machine tool users will go ahead with their plans for the installation of the cost cutting, modern machine tools which are available. Competition in all lines is, and will be, so severe that costs must be reduced to a minimum. The

quickest way to reduce these costs is to install modern machinery. Modern, labor saving equipment pays for itself rapidly. Money is tight right now and probably will be for some time to come; however, this should not impede the installation of needed new standard machine tools because in most cases this equipment can be purchased on a "pay-as-you-use" basis.

C. R. CROWDER, President
Van Norman Machine Company

The cold fact that ruin is the result of outmoded equipment is more and more commonly realized today and should point to good business for the machine tool industry for several years to come. The necessity to maintain cost levels and to reduce costs, if possible, makes it imperative for most manufacturers to improve their productive facilities. Expenditures for new plants have been at record highs for the past few years but the replacement market will provide excellent business for some time. We see a good 1957 in both our domestic and foreign operations. Current backlogs and pending projects indicate full production for our plants through the whole year.

E. P. CUNNINGHAM
Vice President in Charge of Sales
Clearing Machine Corporation

Racine Hydraulics and Machinery, Inc. in the past year procured two new plants, one of which houses our machinery division set up as a separate division in January 1956 to handle the production of our power hack saw and railway maintenance equipment lines. Whereas, it is too early to make a conclusive analysis, we believe separation of the machinery division from our other operations will result in a profitable showing and greater productive efficiency. We feel the peaks and valleys in the machine tool business have leveled off and we can look forward to a 5% to 10% sales increase. The last couple months have shown an upturn, and we expect this trend to continue in 1957.

JOHN E. ERSKINE
Executive Vice President
Racine Hydraulics & Machinery, Inc.

We at Natco see growing emphasis in two directions for the foreseeable future. Companies in highly automated industries such as automotive are turning to special purpose machine tools that will process parts from raw to finished state, including machining, inspection and assembling. Where production requirements are more moderate, we find increased interest in standard production machines for multiple operations on a part with the aid of special tooling and handling as a practical step toward automation.

N. M. "DUTCH" FORSYTHE
Vice President & General Manager
National Automatic Tool Co.

We consider the outlook for the machine tool market for 1957 to be excellent and expect our own volume to increase considerably. Our backlog going into the coming year is improved over last year, a condition partly attributable to the 1955 Machine Tool Show. However, speaking for our own company, I feel that modernization, especially in the field of automatic control systems, has and will continue to be the greatest growth factor in our business.

A. HAROLD FRAUENTHAL
Chairman of the Board
Frauenthal Division
The Kaydon Engineering Corporation

The "Dragon of Obsolescence" still lurks in much of the productive equipment now in use in our metal working plants, which is costing the U. S. A. more than $1,500,000,000 annually. Our country's industrial efficiency — in peace time or for defense — is measured by the performance capacity of its machine tools. New machine tools exhibited at the 1955 Machine Tool Show provided an average productivity increase of 33 percent. A continuing "Replacement Plan" for installation of new machine tools affords industry its greatest opportunity to overcome obsolescence, increase productivity and lower costs.

FREDERICK V. GEIER, President
The Cincinnati Milling Machine Co.

As we enter 1957 following the best peace-time year that the company has ever experienced, Pratt & Whitney's backlog of business is equivalent to approximately six months delivery. We have found it necessary to substantially expand inventories in order to prepare for an indicated increase in sales during the coming year of approximately 25%. This forecast is based upon a continuation of present foreign business volume with the entire increase coming from the domestic area. The company is receiving its full share of automotive control and programming operation business, and interest stimulated by its new automatic machine tools and by its specialty gage installations continues to indicate substantial volume in these vital fields.

EDWARD P. GILLANE, President
Pratt & Whitney Company, Inc.

I think our confidence in 1957 is best expressed by the news release in September which stated that the Warner & Swasey Company had floated a new issue of 120,000 shares of stock to expand their machine tool production 25%. We expect to ship 10-15% more production in 1957 than we did in 1956 and to sell even a greater percent more. Our export business has increased in 1956 over 1955, and because most of these orders came in late in the year, they will probably be shipped in 1957 and give us a normal export potential with relation to the industry. This, however, is not very large. Import competition does not affect us very much although some machines are coming in from England at the moment. The impact of the 1955 Machine Tool Show is a very difficult thing to appraise inasmuch as we announced all of our new model machines before the machine tool show which was part of our policy. Our delivery is not as good as we would like to have it, extending anywhere from two or three months up to nine months. We are going to continue our financing plans such as we have this year, including leasing or renting of machine tools and other deferred payment plans.

N. B. CLARK, Sales Manager
Machine Tool Division
The Warner & Swasey Co.

1957 will be a good year for the machine tool industry which will enter the new year with a seven or eight month backlog. It will be a year of test whether the recent high rate of new orders can be maintained. Congress should recognize that modernization programs have been encouraged by the new depreciation methods, and this important aid to increasing productivity must be retained. We believe 1957 will be a year in which competition for new orders will become increasingly keen. Whether total orders will equal 1956 will depend on the amount of buying by government agencies and on the extent to which shortage of funds forces curtailment of plans for further expansion by the metalworking industries.

EVERETT M. HICKS
Vice President & General Manager
Grinding Machine Division
Norton Company

There is every indication that the machine tool industry will maintain its present high level of activity through 1957. Although there has been a slight decrease in incoming orders during the last two months, backlogs remain high, and in many cases will require at least a year before liquidation. The capital goods market is being strongly influenced by both expansion and replacement. The expansion factor finds direct relationship in the increasing population and continual demand for more goods and services. Replacement is playing an increasingly important part in the picture as machine tool users realize the economics of accelerated depreciation.

GEORGE H. JOHNSON, President
Gisholt Machine Company

The machine tool builders have yet to fail to meet the need for improvement in design method and technique in order to keep pace with economic requirement for greater output. The complexities of mechanism and control in the modern machine has brought greater emphasis to the part that they must play to insure the maximum utilization of the efficiency of this equipment in the user's plant. To this end, 1957 will bring a concerted

effort to provide greater engineering assistance through instructional data, in-plant training and vocational guidance.

R. H. COWAN, Vice President
Snow Manufacturing Co.

Activity during 1956 has shown that industry is looking for increased production equipment. Industry is demanding equipment that will do a variety of operations with one approach to the workpiece. Tooling is demanded to permit simplified control at the machine to control size and transfer such control to the tool crib. There is a definite interest and demand for machine tool equipment with tape control to permit programming a partpiece automatically thereby controlling the amount of production that will be produced. Tape control also provides means to produce complex and intricate parts that are impossible to produce by manual manipulation of machine tools. Tape controlled machines require the training of personnel that will be capable of programming a job by selecting the proper tools, speeds, feeds, and complete setup to make it successful. All these requirements require the purchase of new equipment, therefore we are looking to 1957 as another high volume year.

E. J. KAISER, General Manager
Davis Boring Tool Division
Giddings & Lewis Machine Tool Company

There is good reason for the aggressively modern machine tool builder to be optimistic about his 1957 business prospects. Cost-reducing possibilities with new machine tools were never better and should assure excellent sales despite the possible adverse effect of tight money. The advantage of accelerated depreciation on new production equipment is finally beginning to be realized by the metalworking industry, and this also will work during the coming year to ease the problem of obtaining approval for the capital investment required to buy new cost-reducing machine tools.

ROBERT D. LAWSON, Vice President
Norton Company

Industry and its representatives enjoy viewing new models of machine tools exhibited at various shows. In so doing, they overlook the many advances made which, in themselves, do not necessitate a model change. These technological improvements are an ever-continuing process which all too frequently do not receive the attention they deserve. During 1957 we can look forward to many such changes which will tend to increase production, accuracy, and service while decreasing the level of skill required to operate.

EDGAR D. LEON, President
The Gear Grinding Machine Co.

On July 31, 1956, we closed our fiscal year with substantial increase in volume over preceding years. The following quarter was even better. However, we do not have a large backlog due to the fact we build mostly standard items. Inquiries and volume are sustaining, however, and we believe it will carry into '57. The one big factor in the immediate future is "tight money" which is affecting to some extent the present.

LEONARD E. LOSHBOUGH, SR.
President
Federal Press Company

The increasing complexity of product design, particularly in the automotive and aircraft industries, is demanding new departures and developments in the machine to produce those products. The wider use of automation in its various forms lends further impetus to such new machine developments. Since the last machine tool show in 1955, more new developments in the way of broaching equipment have been launched, we believe, than in any similar preceding period. Such new broaching equipment designs include not only special machines for complex automatic setups, but also numerous special adaptations of standard machines to convert them to special purposes. Among these special adaptations are both new ideas in special fixtures (some semi-universal in nature) and special tooling to accommodate new elements in the way of broaching techniques and demands. In addition we are also witnessing a strong influx of entirely new standard types of broaching machines, as for instance the various types of chain operated machines which permit the use of amazingly long strokes and even continuous broaching at high speeds on highly compact machines.

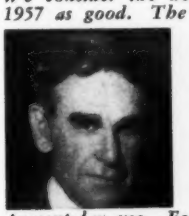
ARVID LUNDELL
President
Colonial Broach and Machine Company

Maximum flexibility for part design changes will continue to be stressed in transfer machine design during 1957. Segmented automation, in which the machines have individual machining units connected by a transfer mechanism will be extensively practiced. Electrical controls for each machining segment will be either placed in individual panels or completely separated in large panels to facilitate maintenance and provide maximum flexibility. The trend to more compact self-contained way-type units which reduce piping and replace combination way-type units and separate power packs will continue. Individual clamping fixtures, rather than types clamping two or more parts will also give added transfer machine flexibility.

HOWARD N. MAYNARD
President
Snyder Tool & Engineering Co.

Domestic volume of machine tool orders will be slightly less in 1957. However, overall industry shipments will be comparable. In 1956 many builders had trouble completing tooling for and perfecting final design of equipment introduced at the 1955 Machine Tool Show. These handicaps have been overcome. With increased capacity, accelerated production rate, approximately a six-month backlog, the shipments in 1957 should be comparable to 1956 despite a slight decrease in new orders.

GEORGE E. MERRYWEATHER
Chairman of the Board & Secretary
The Motch & Merryweather Machinery Co.



We consider the domestic outlook for 1957 as good. The continual development of new machine tools, together with available control devices, opens new vistas and plays its part in effecting obsolescence of thousands of machine tools in present-day use. Foreign sales are continuously more difficult by reason of the shortage of American dollars and also due to increasing European competition. We are optimistic with respect to the future.

EDWARD W. MILLER
President
The Fellows Gear Shaper Company

Domestic volume of the Machine Tool Industry, both in new orders and shipments, continues at a very saisfactory rate. Volume alone is not the sole cause for satisfaction, in the industry. With regular commercial business at a near peace-time high, and with comparatively low defense orders, the demand for the products of the industry is on a solid footing with no artificial stimulus. Brick and mortar industrial expansion is meaningless unless there exists the capacity to equip these new plants with the machinery necessary for production. Whether supplying standard tools, special machines or completely automated factories, the industry has done an excellent job of meeting the demands on it. Pressed to grow at a pace equal to, or surpassing the vast domestic Industry it supplies, the Machine Tool Industry has become a growth industry itself.

H. B. NEWTON
President
Rockford Machine Tool Co.

Within the last few years, we've seen progress in the field of hydraulics that has been little short of miraculous. Today, hydraulically controlled planes take off and land with amazing ease. Hydraulic machines produce products by the millions and still other fantastic achievements are now in the offing. Denison's Research and Experimental Testing Department is consistently striving to bring to the machine tool industry advances in hydraulic design and new equipment. Our new versatile one-

ton Multipress is a prime example of this work. The automation of the production line will next become an actuality, because hydraulics will do the work. With the continuing of new developments in hydraulics, opportunities and new careers will continue to develop for young men in this exciting field where a new era is just beginning.

W. C. DENISON, President
Denison Engineering Division
American Brake Shoe Co.

Increased long range planning of capital improvements plus the international situation should add strength to even short term prospects. However, we believe the chief near term factor affecting capital outlays may be simply management's estimate of the funds that can be made available, whether from anticipated earnings and depreciation or from additional financing. Our own machinery business continues strong, and because of new developments in products and markets, we are optimistic about the immediate future. To back this up, we are planning to expand again in 1957 by adding 30% to our manufacturing areas.

ELLWOOD G. PETERSON
President
Hanniffin Corporation

The machine tool industry will operate at slightly higher levels in 1957, in my opinion. Increased emphasis upon lower production costs, with efforts directed toward elimination of material handling operations, reduction of maintenance costs, and the shaping and removal of metal at the lowest possible costs will increase the demand for presses of both the hydraulic and mechanical types. Greater attention to safety and flexible automatic controls will be evidenced. Machinery built not only the way we want to build it, but the way the customer demands, and which will be more suitable to layout and his specialized needs and operations, will increase sales.

A. W. PHELPS
Chairman of The Board
A. B. Farquhar Division
The Oliver Corporation

A higher degree of "flow" manufacture made more efficient and economical by fully or semi-automatic gaging and dimensional quality control is possible for the metalworking and machine tool industries in 1957 if international tensions can be eased and if our domestic fiscal policies encourage expansion and improvement of production facilities. Close working cooperation between machine tool builders, manufacturers of scientific control and measurement instruments and industrial users has made "autometrology", or automatic size measurement and control, a practical reality. As a result of this progress, the operations of machine tools and assembly machines can now be precisely controlled and integrated by feedback from automatic size-sensing and control elements, enabling industry to detect and avoid size deficiencies before they develop. Growing use of these built-in automatic systems for dimensional quality control promises to be an outstanding development in 1957.

LOUIS POLK
Chairman and President
The Sheffield Corporation

Heavy emphasis will be placed on automatic loading, automatic inspection and automatic controls in the gear production field during 1957. Among these will be loaders for external and internal gear finishing machines, gear gaging and sorting equipment for checking generating and shaving machine tool output, and electronic sound discriminating equipment that rejects noisy gears before assembly. Automatic and semi-automatic loading devices will also be applied on radically new gear tooth honing machines that remove nicks and burrs, and improve sound characteristics of hardened production gears.

WALTER S. PRAEG
President
National Broach & Machine Co.

The machine tool outlook for 1957 would appear to be very good according to present backlog figures, however, a number of other factors will serve to support a good volume for 1957. The recent and continuing automotive industry expansion has introduced many new developments which indicate duplicate orders and opens the way to improvements in other mass production industries. The real effect of the 1955 Machine Tool Show which pointed the way to savings through modernization resulted in inquiries and the introduction of new production problems that will continue to tax the ability of the machine tool manufacturers for solutions.

GERALD P. DIETRICK, Sales Manager
The Morris Machine Tool Co.

Many entirely new plant facilities will be built in 1957 equipped with modern high horsepower, high-speed machines designed to utilize the progress made in cutting tool materials and techniques. It is obvious, therefore, that existing facilities must likewise take advantage of these more rigid versatile machines and modernize to remain competitive. We are looking forward to a good year.

WALTER A. RENTSCHLER
Vice President & General Manager
Baldwin-Lima-Hamilton Corporation

We believe the high volume of orders received since the 1955 Machine Tool Show will be sustained through 1957, resulting in another sales record high for a peace time year. Our planned introduction of several new models in 1957 may boost our total sales on horizontal surface grinders, tool and cutter grinders, and optical comparators even higher than 1956. We expect the major part of this business to come from the replacement market, although plant expansion will be a factor. Additions to our facilities, including the installation of new high production equipment, have enabled us to take care of this demand without having to extend our deliveries unreasonably.

L. L. FILSTRUP, President
Covel Manufacturing Co.

The industry is beginning to feel the impact of the results of the Machine Tool Show. There is no question that many new models shown a year ago were not ready for production, or even possible to supply, until well into the year 1956. Furthermore, the visitors who attended the Show certainly went back to their respective companies and began thinking seriously about the replacement program, and adding to the machine tool needs for expansion programs forecast in 1955. The result can only be an upward trend for the industry.

W. E. RUTZ
Executive Vice President
Giddings & Lewis Machine Tool Company

As to our company, the 1957 outlook appears good and we anticipate 1957 to equal or better our 1956 volume. We feel all manufacturers today have maintained and must continue to maintain a constant modernization program—which we ourselves are conscious of, and have accordingly modernized our plant which has enabled us to continue truthfully the use of our slogan "Most Mill for the Least Money". At a recent meeting of the National Machine Tool Builders Association, importance of modernization was brought out and a survey of the members indicated they expect to spend over a billion dollars on this program within the next year. Deliveries of our products are being maintained to meet customers' needs in most cases.

E. R. GABRIEL
General Manager
Greaves Machine Tool Co.

The year 1957 promises to be a particularly bright one for machine tool manufacturers and all those engaged in the manufacture of production machinery. The dynamic, expanding economy of the United States, high wages, great consumer demand, the increasing scarcity of the labor supply, and new technology, make it imperative for companies who wish to keep even with the economy, to purchase more machinery of the type and kind that will lower production costs through greater and more efficient production. Not only will 1957 be a good year, but the machine tool industry as a whole, will be a more stable industry in the future than it has been in the past.

FRED W. SCHLICHTER
President
The Hamilton Tool Company

It is the opinion of our company that our domestic volume of sales for 1957 will be equal to that of 1956, and possibly a little higher. Our export busi-

ness of standard machines is at an extremely low level. The only possibility of selling our product in foreign countries would be such machines as our automatic positioning jig borer and jig grinder. These types of machines should sell in the European and South American markets. At the present time, the export competition has not caused us any worry. The buyers of these machines in most instances are buyers that will purchase second hand machinery or must have extremely quick delivery.

CARL E. LINDEN
General Manager
The Fosdick Machine Tool Co.

The competition for low production costs among users of metalworking production will continue to emphasize the growing needs for thorough-going restudy when re-equipment is in question. Builders and users alike are realizing more than ever that replacing only one or two machine tools in a product manufacturing facility is not nearly as profit building as complete re-layout and re-tooling of that facility.

HENRY D. SHARPE, JR.
President
Brown & Sharpe Mfg. Co.

Design trend as we so interpret it, for 1957, will continue to integrate special application machine tools into production lines. The most salable features of new machines will be (1) Coordinated design of machine and tooling, (2) Design and construction to improve tool life, (3) Projection of J. I. C. Standards to minimize maintenance, (4) Basic application and design to best integrate with improving material handling techniques.

CHARLES O. LOFGREN
Sales Manager
American Broach & Machine Co. Divn.
Sundstrand Machine Tool Co.

For a number of reasons, we are very hopeful of the outlook for 1957. First of all, 60% of all metal-working machinery is over ten years old. Secondly, competition between manufacturers of consumer durable goods such as automobiles, household appliances, radios, television sets, hi-fi equipment, etc., will become more rigorous. Companies in these industries particularly will find it necessary to increase production and reduce costs to obtain their share of this expanding market. This will necessitate the purchase of new equipment for greater productivity and also the replacement of obsolete machines with modern units adaptable for automation. To keep prices competitive, labor costs per product unit will have to be reduced, and manufacturing concerns who do not use the latest types of equipment and new methods of automation will find themselves in an unfavorable position in the battle for customer dollars. We anticipate that our own business in 1957 will show at least a 10% increase over 1956, which has been a good year.

C. TODD
President
U. S. Tool Company, Inc.

Many incoming machine tool orders can be traced directly to the Machine Tool Show, and indications are that the benefits of the Show will continue. New expansion plans announced or now being formulated, coupled with the present expanding economy, assure a greater volume of machine tool orders in 1957 than in 1956. The design trend of machine tools and special machinery is definitely towards automation as a means of improved controlled production, efficiency and economy in operation, with resultant lower manufacturing costs.

WM. K. STAMETS
President
The Enterprise Company

In our opinion, the machine tool outlook for 1957 is bullish provided that this industry recognizes the preferred position in which it has been placed. The cost of labor has become such a large percentage of the cost of doing business that metalworking plants must buy new type tools produced by our industry, provided these tools are offered at fair prices and will liquidate their cost in a reasonable period of time. As many a wiser man than I has already stated, such a program has always created more jobs and not less by increasing production and reducing cost, thus making the end products more accessible to everyone.

J. B. PERKINS
President
The Hill Acme Company

1956 will be a good year for the machine tool industry. 1957, while possibly somewhat less than 1956, will also show good volume. The industry is feeling a squeeze on profits. This trend will be more pronounced in 1957. Tight money could influence the amount of capital equipment purchased in 1957. Many in the industry have liberal and flexible procurement financing plans. These should be carefully investigated before any expansion or replacement programs are postponed.

H. H. WHITMORE
Vice President & General Manager
Jones & Lamson Machine Company

Figures available as this is written show that the dollar volume of our shipments for the first nine months of 1956 exceeds that for any like period in the past five years. Presently our backlog of new machine tools on order is over two and one-half times what it was just one year ago, and deliveries are affected accordingly. Volume of inquiries is high both in quantity and quality, so the prospects for all of 1957 and into 1958 appear excellent.

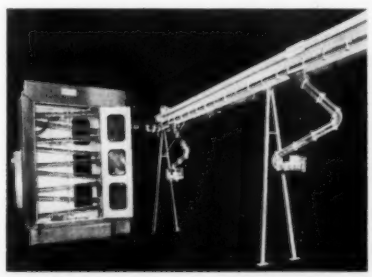
C. R. ROSBOROUGH
President
Moline Tool Company

DEMAND-FEED DISTRIBUTION SYSTEMS

Completely automatic manufacturing, without synchronization and without altering standard machine tools, is now possible by linking those tools into an integrated line by the demand-feed distribution system. One example of such a line is now in operation in a large automotive transmission plant, manufacturing finished and perfect pinion gears at the rate of 900 pcs/hr.

The demand-feed distribution systems designed and built by Cargill Detroit Corporation, Birmingham, Mich., pay for themselves quickly. About 75% of the total cost of such an integrated line is in the conventional machine tools. 10% to 15% is in the Cargill distributing equipment of the system. The remainder is represented by the Cargill automatic gaging and inspection equipment. Perfect parts result, at much lower cost.

Progress of parts through such an integrated line can be either in series or parallel. Each machine tool is always supplied at its own demand rate. This holds true whether all, or some, of the machine tools are operating.



"Elastic" floats are introduced into the systems wherever necessary to maintain an even flow of parts through the line, and absorb the differences in productive capacities between successive machine operations.

Controls for the systems are made up of standard, conventional components and are independent of the machine controls.

Since the relative cost is low, and since conventional, rather than special, machine tools are used, the cost of changing the systems to accommodate future parts changes is minimized.

Pines No. 700 end-finishing machine at Delta-Star. Operator is shown chamfering and deburring 98% hard-drawn copper tubing, of 10" lengths, 3½" OD, and ¼" wall thickness, used in making ferrules for flexible converters.

DEBURRING COPPER TUBING ..COSTS REDUCED 75%

INSIDE AND OUTSIDE deburring operations on copper tubing of 3½" dia by ¼" wall are today handled by Delta-Star Electric Division of H. K. Porter, Inc., Chicago, at a higher rate of production by use of a Pines Model No. 700 end-finishing machine. Delta-Star is known for its fine quality switches and electrical gear.

The copper workpieces, formed into blades used in electrical switchgear, were previously chamfered or deburred on a turret lathe. The workpieces, ranging from 1" to 16' in length and from ⅞" to 3½" OD, accordingly presented a difficult work handling problem and, of course, required hand chucking. Operations were slow and tied up costly lathe equipment and experienced manpower.

Now, the same chamfering and deburring work is handled on the Pines horizontal machine at a production rate that is 3½ times faster which, along with other advantages, has effected a 75% reduction in machining costs.

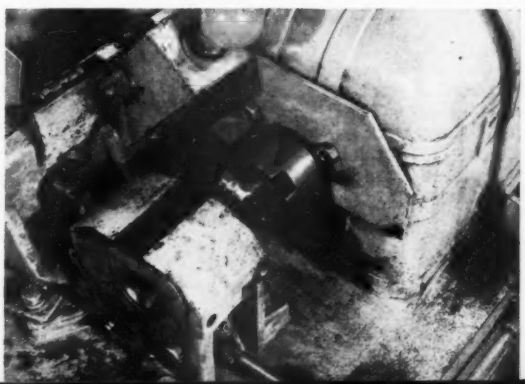
As illustrated, workpieces are air-clamped and are easily handled in and out of the machine. The cutter head is advanced by hand level to the work and the cutters are either one or two-bladed tools, depending on the operation. Simplicity of the machine permits use of inexperienced operators.

The machine, built by Pines Engineering Company, Inc., Aurora, Ill., is also adaptable for center drilling bars, turning a shoulder on a tube, and hollow milling the end of a forging, as well as ordinary facing and chamfering operations. Tools and chuck jaw inserts are interchangeable so that required work diameters can be set within the maximum 3" diameter range of the machine. The spindle drive motor has a variable speed control enclosed within the machine base. The overall compactness of the unit which conserves floor space is also an important factor.

end

Close-up view of the machine with protective guard removed.

Detailed close-up shows spindle in retracted position with carbide tool for inside and outside deburring on same 3½" copper tube.



RAPID QUENCHING WITH REDUCED DISTORTION

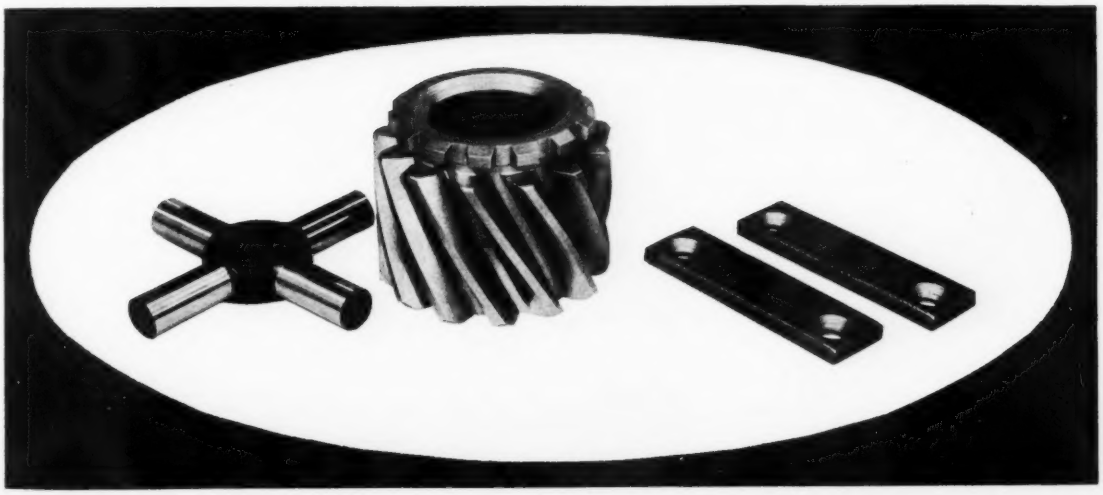
by Robert F. Lutz
Chief Metallurgist
Ohio Axle & Gear Division
ROCKWELL SPRING & AXLE COMPANY
Newark, Ohio

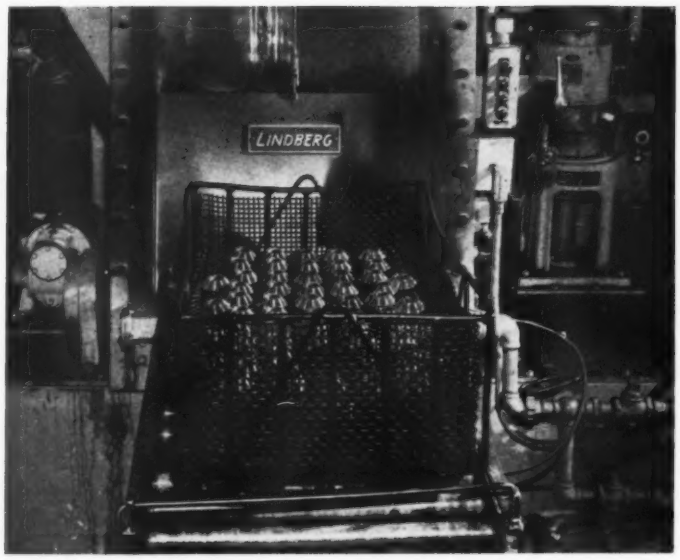
AN AUTOMATIC batch-type furnace operation and a high speed quench oil that can handle a wide range of carbon and low alloy steels have provided us with ideal heat-treating of certain critical axle parts with almost complete elimination of rejects due to distortion, warpage or cracking.

In an integrated manufacturing plant such as Ohio Axle & Gear, which is set up to produce over 2,000 different axle parts, there is a decided advantage in heat-treating certain steel parts in a batch-type furnace that provides automatic handling and complete atmosphere protection. When a versatile quench oil is used in the furnace, we find the combination one that simplifies heat-treating of varied short-run or problem parts which are not economical to handle in high production furnaces.

These parts include small sheet steel stampings, wear plates, washers, rear axle spiders, and transmission gears and shafts — produced

(From left to right) Differential spider made from SAE 50B46 steel, quenched in Voluta Oil 23 for core treatment before induction hardening. Two-speed helical pinion which was reheated in the furnace after carburizing and quenched in Voluta to develop maximum properties (SAE 4817 steel). Spring wear plates, SAE 1020 steel, carburized and hardened to Rockwell C 58.





These parts are rear axle differential pinions which have just been removed from the quench after being reheated and quenched for maximum toughness. This unretouched photograph indicates the cleanliness of metal surface which results from use of Voluta Oil 23.

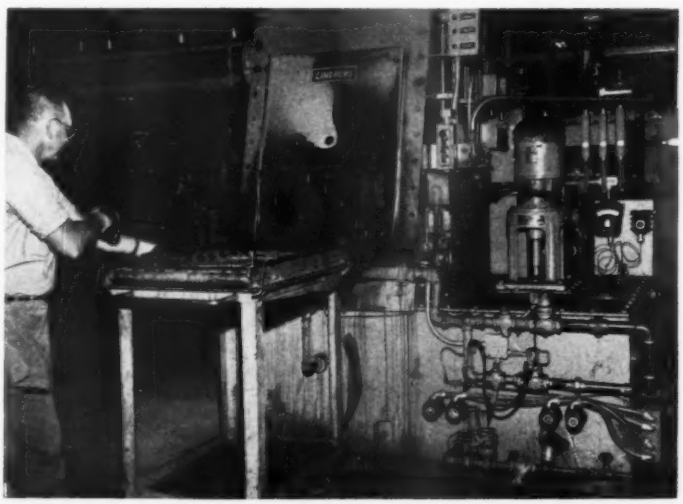
mainly from the carbon or low alloy steels SAE 1020, 8620, 4815, 8640, 4140, and 4145. Previously, some of these parts were handled in a continuous-heat treating system, the procedure consisting of loading the parts on trays, hydraulically pushing a row of trays through a furnace and oil quenching the last tray in the furnace in a simply designed tank.

Particularly troublesome was the hardening of SAE 50B46 differential spiders for truck rear axles, and rehardening after carburizing of helical pinions for 2-speed truck axles (SAE 4817). With conventional quench oils, rejects were high on the spiders due to unfavorable stress concentrations and subsequent cracking — while the pinions presented a distortion problem.

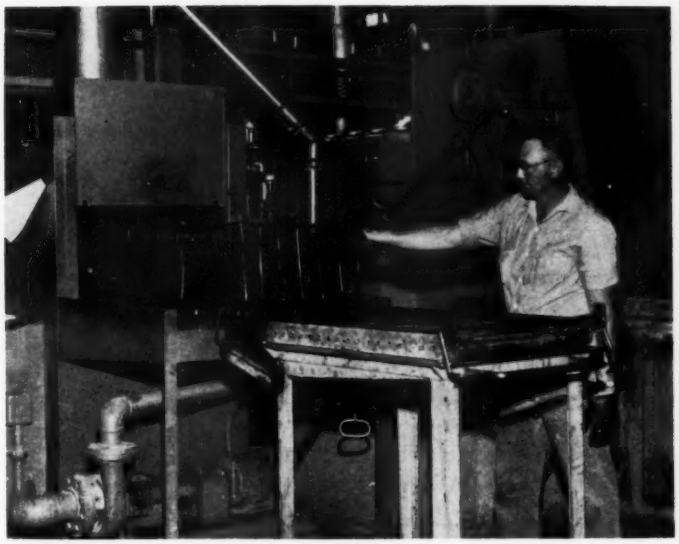
These difficulties were largely resolved by installing two batch-type Lindberg automatic batch furnaces which are equipped with quench tanks having a combined capacity of 1,350 gallons. In the heating portion of the cycle, the relatively small chamber and forced circulation provide extremely fine control over temperature and atmosphere conditions within the furnace. In the quenching portion of the cycle, the important uniformity of agitation is maintained by a 3-hp propeller agitator circulating the oil down through the work load. The oil is cooled by plant water, or heated by electric immersion heaters as needed.

Most conventional quenching oils perform fairly well at 100 to 150°F, but, at temperatures higher than 150°F, the oils tend to break down, and the rate of formation of sludge, varnish and acid products is greatly accelerated. These products serve to reduce the quenching efficiency of the oil and result also in dirty stock.

Voluta Oil 23, made by the Shell Oil Company, was found to have the required stability



The air-operated door of the furnace has opened and a basket of quenched parts is being withdrawn. The purge chamber door is protected with a flame curtain to prevent possible contamination.



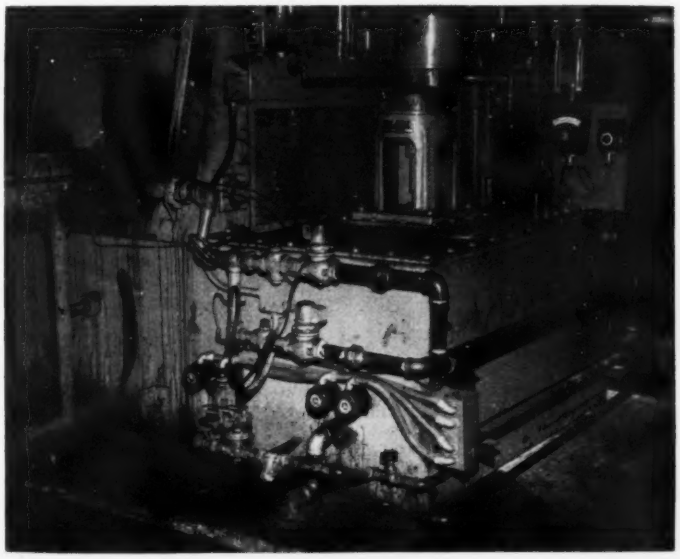
After removal from the furnace, the heat-treated parts are spray washed with an alkali solution in this machine.

at 150 to 170°F, plus optimum quench characteristics such as: a) excellent heat transfer, the high thermal and oxidation stability giving long service life without the formation of sludge; and b) thorough wetting of all surfaces in a uniform quench action that holds the required dimensions of normally easy-to-distort parts.

Because of Voluta's superior wetting-out properties and consistently stable cooling rate, we were able to attain maximum uniformity of cooling of carbon and low alloy steels. For our heat treating purposes the quench oil proved suitable at temperatures from 130 to 200°F, and also provided greater surface hardness, depth of hardness, and uniformity of hardness.

In the batch furnace, the temperature of the oil in the quench tank is controlled by a fin-type oil cooler mounted directly in the tank. By a system of controls for either cooling or heating the oil, the exact temperature to provide ideal hardening results can be easily selected for each of the various types of work. Too, all parts that are basket loaded are equally and fully quenched.

For example, 2⅞" diameter transmission shafts made from SAE 8640 steel are held consistently to 52-54 Rockwell C hardness after quench by holding the oil temperature to 130 to 140°F. Higher temperatures would not provide full quenching on this size shaft. Similarly, the batch hardening method is ideal for the final hardening of 4145 steel shafts up to 3" diameter which require 375-430 Brinell after draw. The high "as quenched" results obtained with Voluta were not possible with conventional oils.



The built-in quench tank has a capacity of 625 gallons, and oil is agitated by a propeller to give positive flow through the workload while it is in quenching position.

At the other extreme, thin-walled fine pitch transmission gears made from SAE 4620 or 8620 steel that are carburized are quenched in oil as high as 180 to 200°F to keep distortion to a minimum.

We use the Lindberg furnace for carbonitriding, carburizing, and hardening. Typical cycles for these heat-treating processes would be:

Carbonitriding

Heat and hold at 1450°F. (total time for 250-lb load — 50 min). Drop temperature to 1390° (30 min for load to drop). Hold for 1½ hrs at 1390°F.

Remove and cool in vestibule under atmosphere. Atmosphere is 350 cfh carrier gas, 10 cfh natural gas, 80 cfh ammonia. Parts processed in this way are slowly cooled in the vestibule and still come out file hard. It is used for certain thin parts requiring a hard surface, but which cannot be oil quenched because of warpage. Case depth is .006".

Carburizing

For carburizing to .050" case depth.

Hold parts at 1700°F for 2½ hrs with 350 cfh carrier gas, 25 cfh natural gas. Diffuse for additional 1½ hrs at 1700°F with 350 cfh carrier gas, 5 cfh natural gas. Drop temperature to 1600°F (approx. ½ hr). Quench 10 min at 150 to 170°F oil temperature.

Hardening

For hardening 4145 steel from 1550°F.

Total heating and holding time in furnace 1 hr, 20 min for 250-lb load. Quench 10 min at 135 to 150°F oil temperature.

The present system has been in operation for over nine months, and in that time only about 55 gallons of Voluta have been added. There has been negligible dragout loss because of rapid drain-off and higher oil temperatures possible with the oil.

Even though initial costs for the oil are somewhat higher, actual savings stem from the assurance of clean, perfectly hardened parts, wide range of versatility and sustained quality. Also with the batch type method, providing a small quenching system, there is no problem with set-up time. **end**

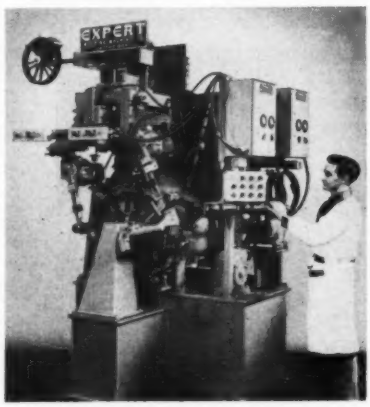
WELDER FEATURES CAM INDEX AND CLAMPING MECHANISM

A new automated 8-station trunnion-type index arc welding machine, which features a unique cam index mechanism and a simple cam clamping mechanism, decreases cycle time and thereby increases production. It also simplifies overall machine complexity.

The machine illustrated, developed by the Expert Welding Machine Co., 17144 Mt. Elliott Ave., Detroit 12, welds together, by the CO_2 shielded arc method, an outer cup and support bracket to produce 433 automotive motor mount bracket assemblies per hour at 80% efficiency. By changing the clamping fixture, the machine can be adapted to a variety of two-piece parts which require joining with longitudinal welds. Furthermore, the basic design is adaptable to submerged arc or argon shielded arc welding.

Basically the machine consists of a trunnion type index mechanism driven by the standard Expert cam index drive enclosed in the base of the machine; eight clamping fixtures that are mounted on the trunnion and rotate about a stationary cam which automatically clamps the two workpieces together; and two welding heads that are mounted on a common saddle type carriage which moves in a longitudinal direction during the welding operations. The carriage is driven by a ¾-hp electric motor, gear reducer, rack and pinion. Welding wire is fed to the two heads by means of two electric powered roll feeders which are mounted on the movable carriage.

In the operation of the welder, a cup and bracket are manually loaded



into a two-part fixture at station one which is the 3-o'clock position on the counter-clockwise rotating trunnion. The two-part fixture consists of a stationary component and a movable component that is activated by a stationary cam. The cup is loaded on the stationary fixture component and the bracket on the movable cam activated fixture component. As the parts are indexed to station two, the movable fixture component, riding on the cam, is forced radially outward until the bracket is clamped against the cup.

In the second station, a 2½" longitudinal arc weld is made along one side of the cup and bracket as the carriage mounted welding head moves longitudinally across the part. The head clears the part after the welding operation to permit indexing. The part is then indexed through idle stations three and four to station five.

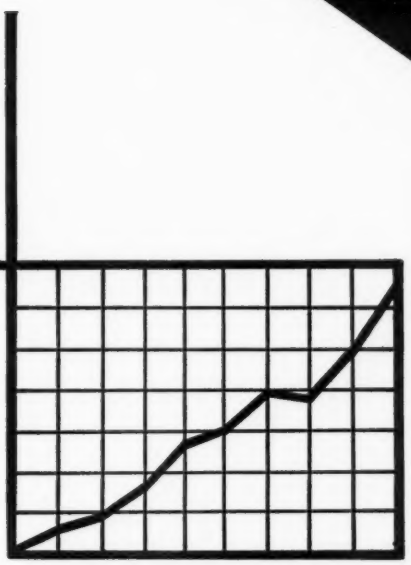
In the fifth station, which is the 9 o'clock position on the trunnion, a 2½" longitudinal arc weld is made along the other side of the cup and bracket assembly in the same manner as in station two. This completes the welding operations that join the cup and bracket assembly on two sides.

During the index movement from station five to station six the movable fixture rides off the cam, unclamping the part. In station six the completed assembly is automatically ejected from the fixture by an air cylinder. Power for the cam drive is supplied by a 1½-hp electric motor. Welding current is supplied by two 600-amp rectifiers.

JANUARY 1957

A SCIENTIFIC MANAGEMENT ARTICLE

The Principles of INVENTORY MANAGEMENT *that Lead to Higher Profits*



by Nyles V. Reinfeld
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Cleveland 14, Ohio

PART III: Miscellaneous Inventory Problems

MARGINAL ANALYSIS

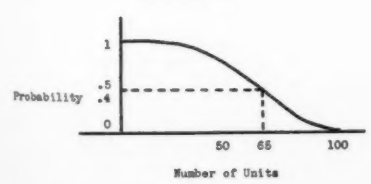
MARGINAL ANALYSIS will be discussed only with reference to a single case — the style goods problem. Furthermore, only one time period will be assumed. Consideration of several time periods complicates the method sometimes beyond practical usage. However, the general problem has been solved.

The marginal analysis example discussed here applies to many similar situations. In addition, the reasoning applies to a variety of problems.

Where style is a factor, liquidation losses may be high due to frequent changes in styles. Hence, the firm may find it necessary to mark down or destroy any out-of-style items which it could not sell.

To illustrate the procedure, a shop has determined from past experience that it has very little chance of selling 100 units of a certain style. Its chance of selling one such unit is very high. From its experience, the shop is able to develop a sales probability distribution as follows:

FIGURE 11



In other words, the probability of selling no units is one, and the probability of selling 100 is zero. The probability of selling any number in between zero and 100 is computed from past experience.

The problem now becomes: How many units should be purchased to maximize the expected profit?

Clearly, the amount to purchase is not just what the store is certain of selling. The maximum profit will be obtained by "taking a chance" on some sales to the extent that the expected liquidation losses are less than the expected profit. In other words, it is desirable to keep buying long as the expected profit of a unit exceeds the expected loss. In this way, we will quit buying when the expected loss and profit of a unit balance. Such a policy will result in the maximum profit.

The statement of this condition of marginal profits is given by

$$1.\quad Pp^* = (I - p^*)\,L$$

Where the left side is the profit (P) to be made times the probability (p^*) of selling the product, and the right side is the loss (L) times the probability of loss ($I - p^*$).

Solving the equation (1) above for p, we get

$$2.\quad p^* = \frac{L}{P+L}$$

This equation (2) gives us the optimum probability at which to purchase.

In the shop we've selected as our example, the profit is $6.00 and the liquidation loss is $4.00. Using these values in (2), we find that

$$p^* = \frac{4}{6+4} = .4$$

is the optimum probability.

From the sales distribution chart of Figure 11, we find that for a probability of .4, we should purchase 65 units. Such a purchase policy will maximize the profit of the shop.

THE PROBLEM OF SEASONAL SALES

IN THE PRECEDING SECTIONS, sales were assumed to be fairly constant. For many firms, sales may fluctuate quite widely at various times in the year, creating problems of production and storage bottlenecks, idle manpower with high turnover and training costs.

When the seasonal pattern is not extreme, or can be treated as two separate phases, the problem can be handled by double application of the above principles.

For example, if sales are constantly high during the summer and low during the winter, such as in the farm implement industry, the formulas previously considered are applied twice: to forecasted winter usage; and to forecasted summer usage. Thus, such a firm will have two sets of order quantities and two sets of reorder points.

Even under the principle of double application, bottlenecks may develop which will complicate the issue beyond reasonable human ability to solve in the most economical fashion.

Fortunately, for complicated problems of this type, there is a recently developed technique, Mathematical Programming, which can be readily applied to these problems.

Through the use of Mathematical Programming, it is possible to solve the seasonal problem . . . taking into account all the interrelating factors of: storage capacity, production capacity, labor costs, the guaranteed annual wage, overtime costs and storage costs. Taken in their entirety, such an accumulation of factors would pose a prohibitive barrier against the solution by mental gymnastics.

The use of Mathematical Programming permits the problem to be of any magnitude and more important, it guarantees a solution which is best for the conditions imposed.

Hence, Mathematical Programming offers a savings in overall plant operation that far exceeds any of the procedures previously discussed. It is my firm belief that the problem of controlling seasonal inventories offers one of the most fruitful areas for the application of Mathematical Programming, exceeding the savings that these techniques have accomplished in such diverse fields as production scheduling, profit analysis and distribution applications presently in use.

There is good reason for such a statement: First of all, the problem is a typical recurring one in many companies, and second, it represents an area in which management has heretofore tried piecemeal solutions, usually based on expediency.

An illustration will suffice to demonstrate the problem: A company makes a large number of similar products in which labor represents one-fourth of the cost . . . material and purchased parts representing the other three-fourths. The sales forecast for these similar products has been made for the coming year. This forecast is next reduced to total man-hours required to produce the forecast. Hence, all figures are given in terms of man-hours.

The forecast is shown below in Figure 12.

The labor rate is $2.00/hr and overtime is $3.00/hr. The material cost (per man-hour) is $6.00. The firm also has a policy (similar to the G.A.W.) in which each employee receives $1.00 for every hour he is layed off. The carrying charge on inventory has been determined to be 24%/yr, or 2%/mon. (Actually a non-linear carrying charge can be included without complication). The operating capacity of the plant (in man-hours) is 170/mon. In actual practice, the productive rate should be computed for each month, because the number of days varies from month to month. The overtime production rate per month is 30. Finally, the firm is on the Lifo system . . . such that they wish to return to the same inventory each January 1. On January present, the inventory is 100.

Once the data has been gathered, it is formulated into a table called a "matrix" to be solved by Mathematical Programming. The table is shown opposite with the best solution indicated by the circled figures.

The figures in the column entitled "Forecast" are the amounts to be produced to meet the forecast. Since 100 units are on hand in January, any production during January will be stored and used at some later period, starting in February.

The letters at the head of the columns labeled J, Jo, F, Fo, and so on, refer to January, January Overtime, February, February Overtime, and so on. The available capacity for each of these periods is given at the foot of the appropriate column.

The —8.16 in the small square under column "J" is the labor and material and one month storage cost of the product produced in January for use in February. Since the item is stored one month, the carrying charge is 2% of $8.00 or $.16. The figures in the Jo column are the costs for overtime production, plus storage.

The solution indicated (by the circles, shows that no overtime is required and that a maximum storage time of three months will meet the requirements. The mathematical method of solution is too detailed to be covered at this time. Suffice to say, that any one of a number of well known techniques can be used to obtain and prove the answer, including a simple method known as Vogel's Approximation Method, which can be learned in ten minutes.

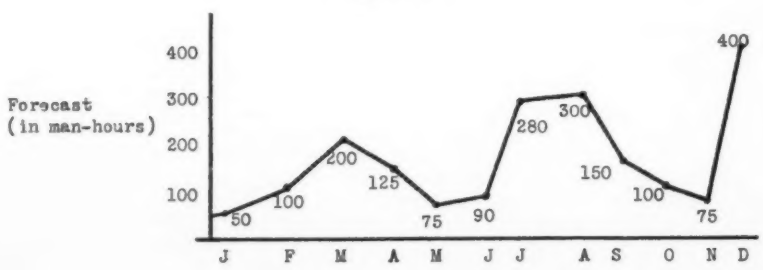
Other solutions can be obtained simply from this one: First, it is possible to determine whether it is cheaper to work overtime and reduce personnel; or second, it is possible to evaluate an increase in personnel versus storage costs.

The table as set up can be made to include a number of other factors such as training costs and non-linear carrying charges.

Because the table includes all pertinent data normally associated with such a problem, a better evaluation can be obtained than by any other means.

The problem as stated has been considerably simplified. Warehouse restrictions can be added and other products with different seasonal patterns included.

FIGURE 12



SAFETY ALLOWANCES IN CONTINUOUS PRODUCTION

CONTINUOUS PRODUCTION POSES PROBLEMS which may be quite different from those encountered by job-shop-type operations. In the case of certain parts suppliers for the auto industry, for example, some machines may run continuously throughout the year without breaking into a setup. Hence, the economic lot size or order quantity formula has no application.

It is still desirable to determine what kind of a cushion is necessary to provide the required protection against stock-outs. A lead time — and from it, usage during the lead time — may be calculated on the basis of the time it would take to get into increased production. With this information, the methods discussed could be applied. Another, and possibly more accurate, method is to set up the cushion or safety allowance on the basis of standard deviation.

Here, we find ourselves borrowing heavily on statistics, and particularly, Statistical Quality Control.

The concept of standard deviation is not difficult to understand and use, and can, perhaps, best be illustrated by an example.

In one company, producing 12-volt batteries on continuous production, their actual shipments to sales over a 10-day period have been: 10, 50, 80, 160, 0, 40, 10, 100, 10 and 40 per day, respectively.

What safety allowance should the company carry?

The safety allowance is determined directly from the standard deviation which is computed as shown by the table below:

The formula for standard deviation (S.D.) says one standard deviation is equal to the difference between the accumulated actual sales and accumulated average sales. These differences are squared and the squares are added and divided by one less than the number of days. The square root is then taken.

This formula gives the number of batteries to be carried in safety to protect the firm against one stand-

SEASONAL PRODUCTION TABLE

MONTH	FORE-CAST	J	Jo	F	Fo	M	Mo	A	Ao	M	Mo	J	Jo	J	Jo	A	Ao	S	So	O	Oo	N	No	D	Do
F	50	-8.16	-9.18	-8.00	-9.16																				
M	200	-8.32	-9.36	-8.16	-9.18	-8.00	-9.00																		
A	125	-8.48	-9.54	-8.32	-9.36	-8.16	-9.18	-8.00	-9.00																
M	75	-8.64	-9.72	-8.48	-9.54	-8.32	-9.36	-8.16	-9.18	-8.00	-9.00														
J	90	-8.80	-9.90	-8.64	-9.72	-8.48	-9.54	-8.32	-9.36	-8.16	-9.18	-8.00	-9.00												
J	280	-8.96	-10.08	-8.80	-9.90	-8.64	-9.72	-8.48	-9.54	-8.32	-9.36	-8.16	-9.18	-8.00	-9.00										
A	300	-9.12	-10.26	-8.96	-10.08	-8.80	-9.90	-8.64	-9.72	-8.48	-9.54	-8.32	-9.36	-8.16	-9.18	-8.00	-9.00								
S	150	-9.28	-10.44	-9.12	-10.26	-8.96	-10.08	-8.80	-9.90	-8.64	-9.72	-8.48	-9.54	-8.32	-9.36	-8.16	-9.18	-8.00	-9.00						
O	100	-9.44	-10.62	-9.28	-10.44	-9.12	-10.26	-8.96	-10.08	-8.80	-9.90	-8.64	-9.72	-8.48	-9.54	-8.32	-9.36	-8.16	-9.18	-8.00	-9.00				
N	75	-9.60	-10.80	-9.44	-10.62	-9.28	-10.44	-9.12	-10.26	-8.96	-10.08	-8.80	-9.90	-8.64	-9.72	-8.48	-9.54	-8.32	-9.36	-8.16	-9.18	-8.00	-9.00		
D	400	-9.76	-10.98	-9.60	-10.80	-9.44	-10.62	-9.28	-10.44	-9.12	-10.26	-8.96	-10.08	-8.80	-9.90	-8.64	-9.72	-8.48	-9.54	-8.32	-9.36	-8.16	-9.18	-8.00	-9.00
To re-turn to Stock	100	-9.92	-11.16	-9.76	-10.98	-9.60	-11.80	-9.44	-10.62	-9.28	-10.44	-9.12	-10.26	-8.96	-10.08	-8.80	-9.90	-8.64	-9.72	-8.48	-9.54	-8.32	-9.36	-8.16	-9.18
Idle Pay	455	-1	C	-1	C	-1	C	-1	C	-1	C	-1	C	-1	C	-1	C	-1	C	-1	C	-1	C	-1	C
	2400	170	30	170	30	170	30	170	30	170	30	170	30	170	30	170	30	170	30	170	30	170	30	170	30

PLANT CAPACITY BY MONTH AT STRAIGHT & OVER-TIME

FIGURE 13

ard deviation of random sales; in other words, for this example a safety allowance of 47 units with stock-outs up to 15.87% of the time. Greater protection can be obtained by using a higher number of standard deviation. For this reason, we refer to Figure 10 and note that for d = 1 the percentage of stock-outs is 15.87%. Because of the direct relationship between d and S. D., we can select the desired protection we want from Figure 10, as we have done in preceding sections and find d. Knowing d, we find the required cushion to give us the desired protection by the formula:

The Safety Allowance = d x S. D.

For example, if we will accept stock-outs 1% of the time, we know from our previous studies that d = 2.33. The safety or cushion in the example becomes 2.33 x 47 = 110. A cushion of 110 batteries will be sufficient to protect against stock-outs 99% of the time, under normal conditions.

Figure 14 below shows the average accumulated sales plotted on a chart with 2.33 standard deviations added and subtracted from the average line to give control limits. (These control limits are widely used in Statistical Quality Control as a visual means of showing the status of production.) As sales are received, they are plotted on the chart, giving a visual record of the status of the inventory. The upper control limit represents the point at which stocks are depleted.

A similar approach has been used effectively by General Electric Company to control production from sales forecasts. The U. S. Government has also used the same procedure for controlling production rates against annual requirements. In the latter case, it is expected that output will vary from month to month, but it is important to know whether the variation is acceptable. The accumulative production is plotted monthly, and if it falls outside either of the control limits, immediate action is indicated. The control limits thus act as a point of decision.

As a final word, it should be noted that the more days that are included in the computation of S. D., the more accurate will be the results. Furthermore, S. D. can be computed on accumulative daily, weekly or monthly sales depending on the way in which shipping dates are assigned.

CONCLUSIONS

THE APPLICATION OF THE SPECIFIC PRINCIPLES outlined in this paper will provide for more economical operation, by reducing costs and balancing inventory, and will improve customer delivery.

The techniques described require very little mathematical training, never exceeding high school algebra.

The most difficult aspect of the use of such principles is in putting them into practice. However, experience in our Inventory Management program in Cleveland has shown that plant personnel with very little training can learn to use these techniques on their own and will obtain very satisfactory results.

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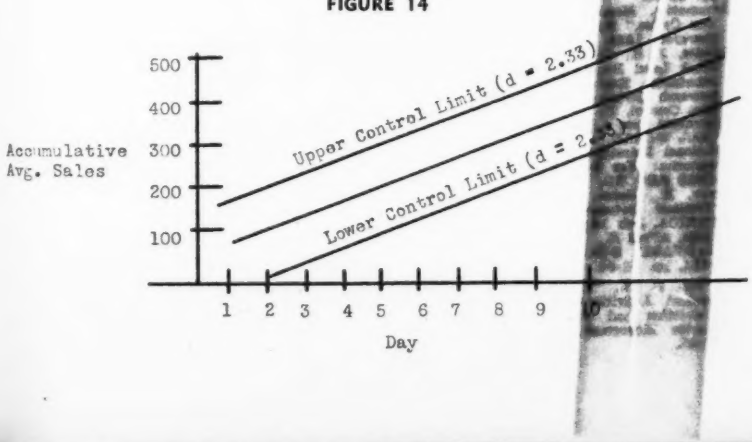
The author would like to express his thanks and indebtedness to Dr. T. M. Whitin of the School of Industrial Management, Massachusetts Institute of Technology, for many of the ideas and concepts expressed herein.

FIGURE 14



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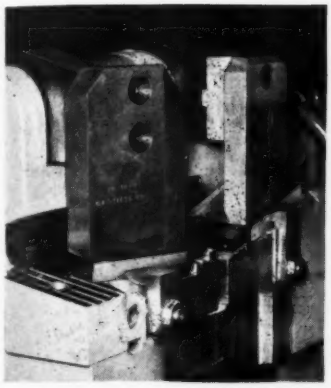
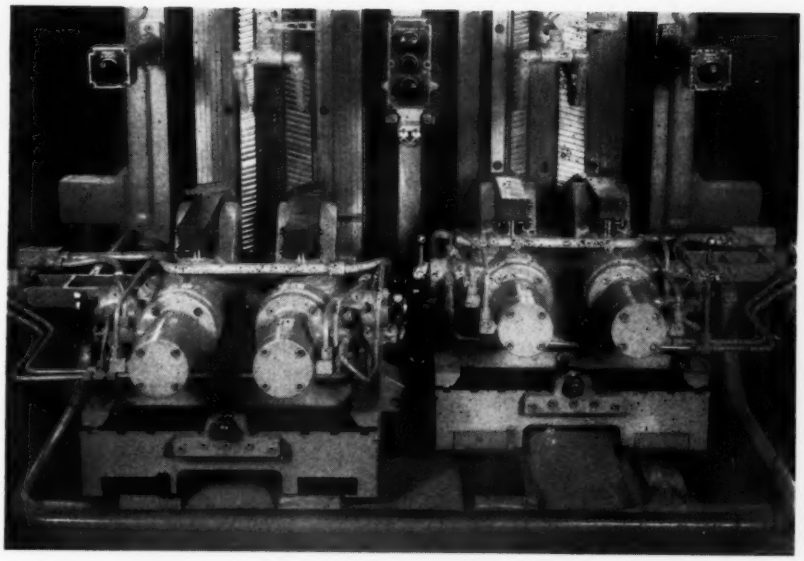


Two tool bits clamped in position, as seen by the broaching cutters. The top relief will be broached on one of these blanks and the side relief on the other.



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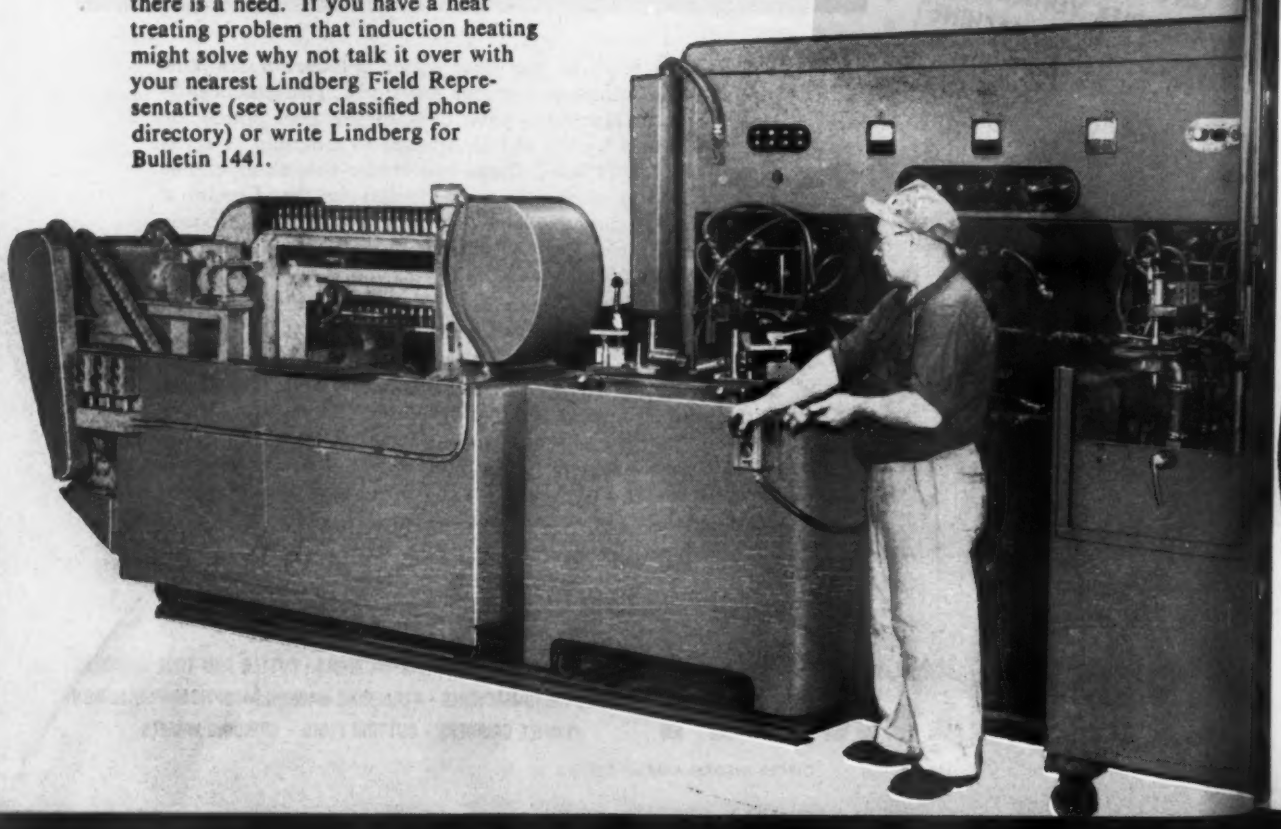
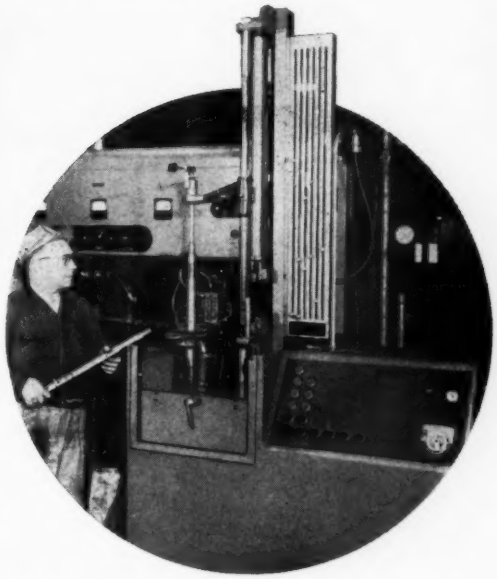
Lindberg Induction Heating Units are designed for heat treating, brazing, soldering and heating, for forming or forging—in machine shops, production lines, heat-treating shops—wherever there is a need. If you have a heat treating problem that induction heating might solve why not talk it over with your nearest Lindberg Field Representative (see your classified phone directory) or write Lindberg for Bulletin 1441.

Below is photo of Lindberg unit at J. I. Case with 2 fixtures on station. Fixture in center easily changed as it rolls out on track. Fixture at left is also on track for easy movement on station. Fixture at right is ordinarily kept on station but is provided with rollers if change is required.



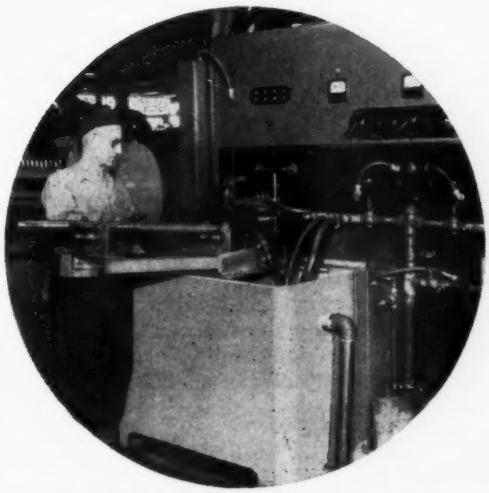
(Above) Hydraulic male coupling is being treated on this fixture. 3 other parts are treated by it, too.

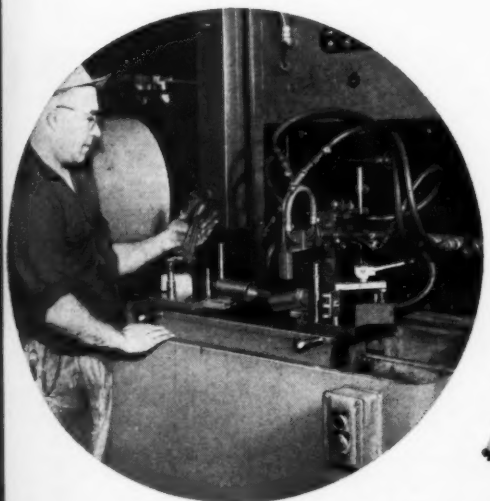
(Below) This fixture is shown selectively hardening a front axle king pin. It handles piece up to 45⅞" long, 35" of which can be scanned to desired depth. It is also used for 34 other parts.



(Above) This shows fixture handling inlet and exhaust valve rocker arms. Same fixture treats 6 other parts.

(Below) Power take-off hydraulic drive shafts are one of the 3 parts treated by this fixture.





(Above) This fixture is selectively hardening pads and slots on shifter forks. It is also used for treating 17 other parts.

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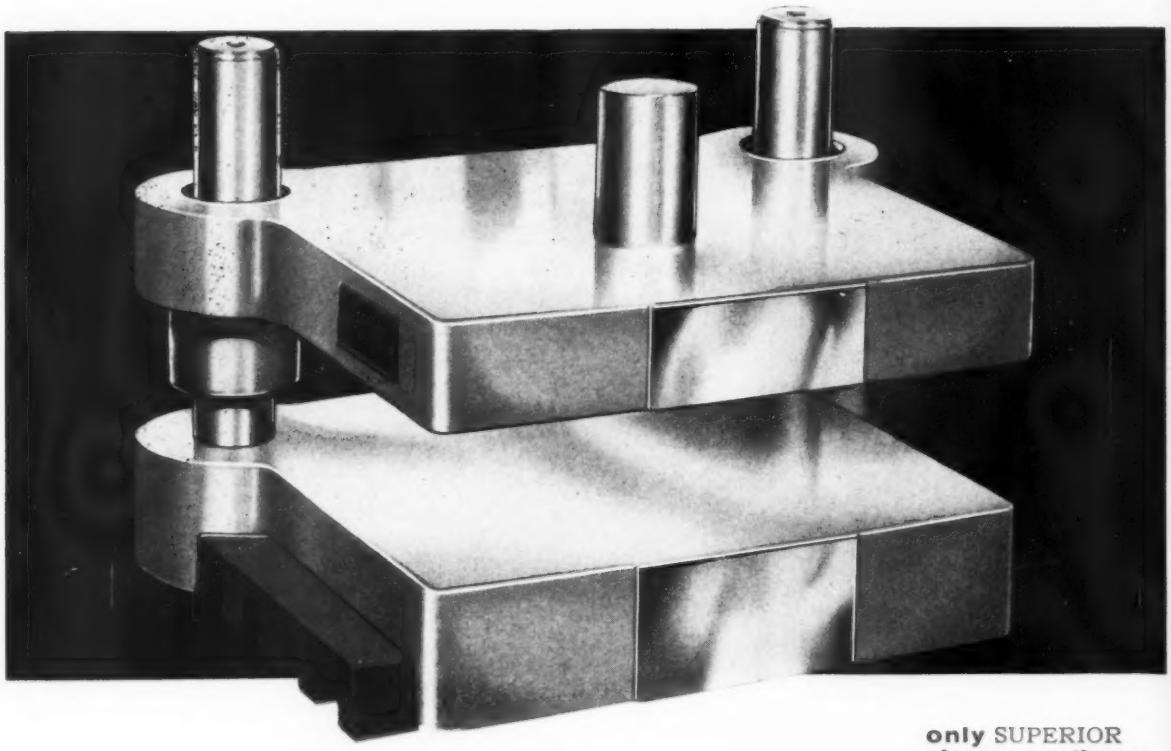

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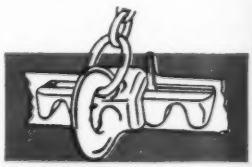

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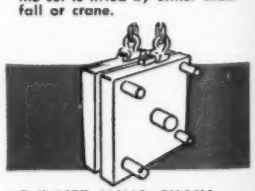

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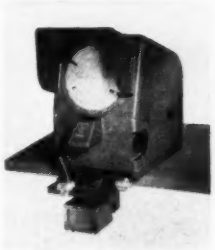

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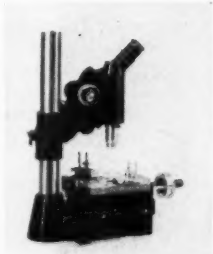

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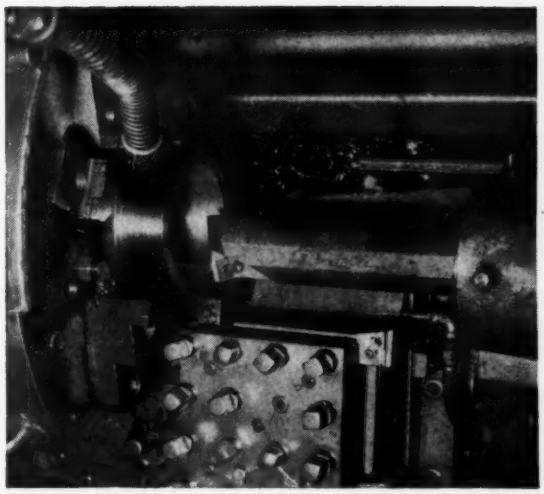

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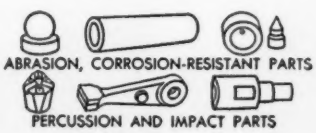

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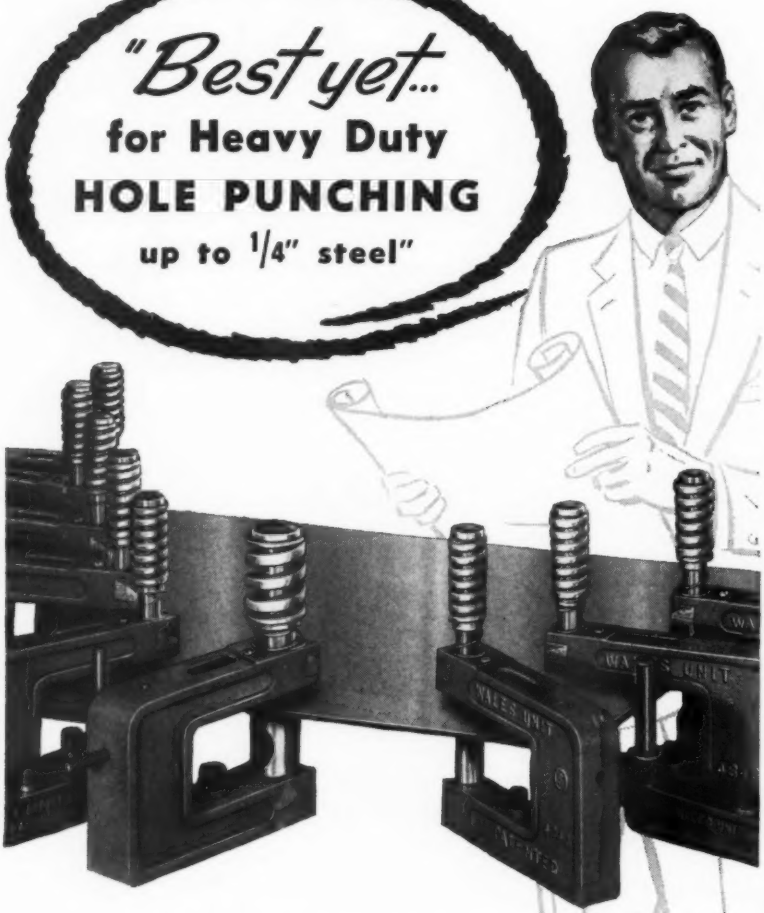

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WALES CJ Units punch unlimited straight line staggered and scattered patterns . . . round or shaped holes. Die retention design features rapid die change WITHOUT REMOVING UNIT from set-up . . . provides controlled slug ejection. Time saving and money saving. Same units may be used over and over again in other patterns.

SEND FOR BULLETIN No. 27
Shows actual job work and complete data of CJ sizes.

WALES MOBILE FIELD UNITS
Demonstrate CJ and other tooling right at your door. Ask for details.

WALES Strippit COMPANY
"...the Wales-Way is the PLUS-PROFIT way"
AKRON, NEW YORK
WALES-STRIPPIT OF CANADA LTD., HAMILTON, ONT.

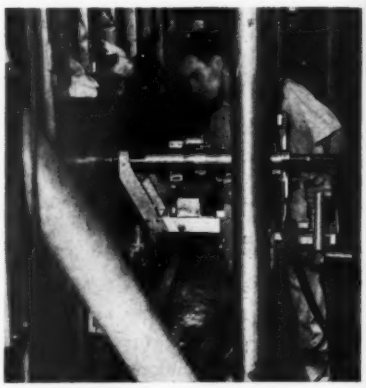
CIRCLE INFORM-A-GRAM KEY NO. 94

SELF - ALIGNING COUNTERSINK

The wing skin and fuselage of a high speed jet plane contain thousands of flush-driven flat-head rivets and screws. Each hole must be countersunk to a very close tolerance; at supersonic speeds even a few thousandths of an inch protrusion is aerodynamically unsound. The countersink must be exactly perpendicular to the surface of the skin, and the depth of cut must be precise.

These two problems led to Martin Aircraft's development of the self-aligning fixture which solves both problems.

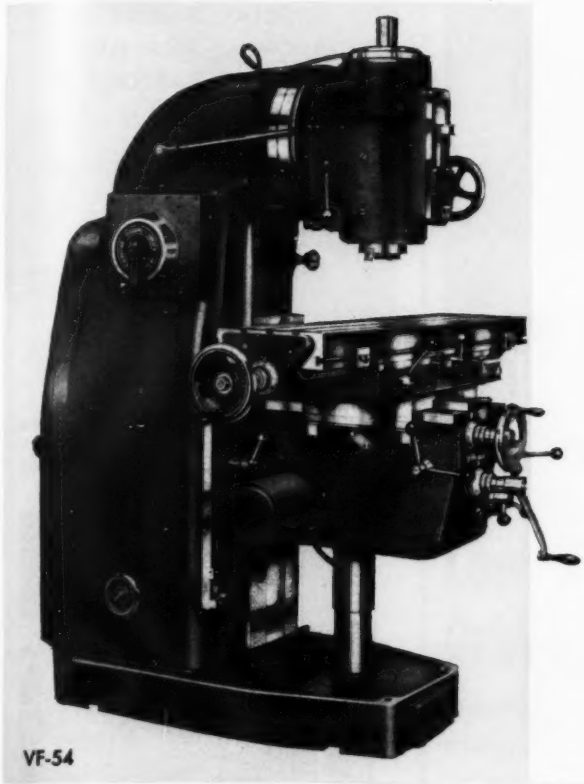
The self-aligning feature consists of a 6" dia metal ring and holder for a standard Airfeedrill. Three micro-switches located in the nose of the drill holder control a solenoid which, with suitable linkage to the valve, actuates the on and off operations of the drill. A magnet contained in the base locks the drill in position.



In use, the operator moves a vertical handle actuating an air cylinder which presses the unit against the skin and causes the drill to move to a 90° normal position. The micro-switches contact the skin during this operation and actuate the magnet and solenoid. However, all three micro-switches must make contact at this time; if one switch loses contact because of a deviation of the drill from the exact 90° angle, the switch opens and stops the drill. Under the thrust developed by the drill, when the proper depth has been reached a pressure pad on the countersink forces the unit away from the skin, thus opening the micro-switches and stopping the drill.

The rigging for the drill contains two vertical tracks on which the entire assembly rides, counterbalanced by weights, and hangs on a track for horizontal movement. At the beginning of the operation, the alignment of drill with the hole in the skin is done visually by the operator.

The old method of using a hand-operated drill took approximately 30 sec/hole. This new method takes only 6 to 7 sec for each countersink with greater accuracy.



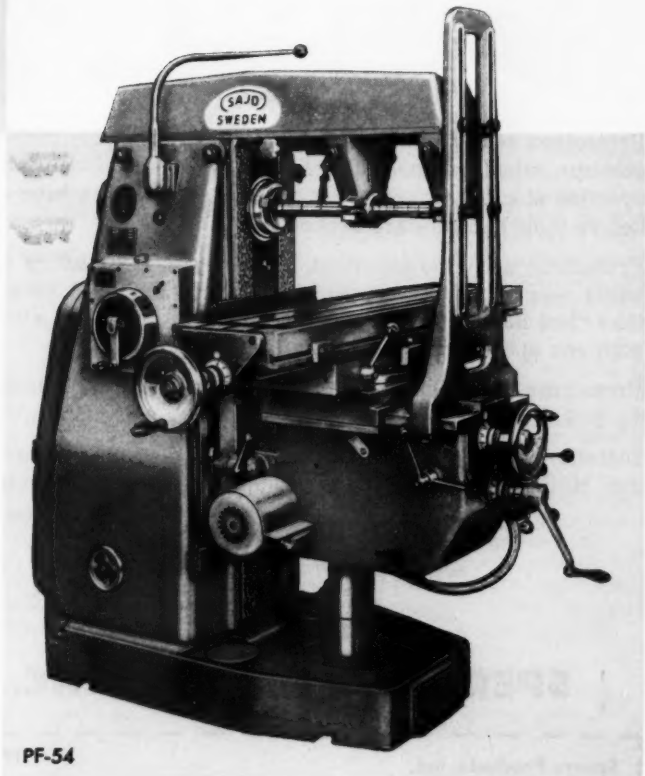
VF-54

ONLY SWEDISH CRAFTSMEN

Can Build These Precision Millers At Such Surprisingly Low Cost

HORIZONTAL AND VERTICAL SAJO MILLERS

Built to U.S. Standards, Sajo Millers with proven production records in modern industry are available in both plain and universal models. Installation references in your vicinity on request.



PF-54

Standard Duty #2 (Model 54)
ALL GEARED Millers—

Plain, Universal and Vertical—table 52" x 11", 7½ HP with power feeds (longitudinal 33½") and power rapid traverse.

•

Light Duty #2 (Model 53)
ALL GEARED Millers—

Plain and Universal—table 41⅜" x 9¼" —3½ HP with power feeds (longitudinal 24½").

Light Duty #2 (Model 48)
Utility Millers—

Plain and Universal—table 41⅜" x 9¼" —3½ HP with power feeds (longitudinal 24½").

austin INDUSTRIAL CORPORATION

76-X MAMARONECK AVENUE • WHITE PLAINS, NEW YORK

HORIZONTAL AND VERTICAL SHAPERS • POWER HACKSAWS

FAST SERVICE AND PARTS AVAILABLE FROM MAJOR CITIES, WRITE FOR CATALOGS

CIRCLE INFORM-A-GRAM KEY NO. 95

This punch press control...

- **cuts tool and die breakage**
- **saves valuable manpower**
- **raises punch press output**

Sperry

PROTECTRON*

mechanical overload detector

Protectron senses electronically slightest overloads caused by pile-ups, misfeeds, tool dullness or misalignment, overhard or oversize stock, or faulty lubrication . . . shuts machine down before tools and dies are broken.

Protectron needs no attention, keeps machines running safely while operator gets new stock or takes a break. It saves you that "lost hour" per day. With Protectron on guard, also, one man can operate several machines at once.

Protectron is best utilized on 5- to 100-ton presses. It monitors 1-, 2- and 3-phase, 60-cycle ac, 220- or 440-volt motors.

Installation is simple, control is versatile, action is instantaneous. Mail the coupon below for complete technical information.

*Trade-mark

Backed by Sperry's nationwide sales and engineering services

Sperry

SPERRY PRODUCTS, INC.
Danbury, Connecticut

TP-1

Sperry Products, Inc.
Danbury, Connecticut

☐ Send me complete Protectron information
☐ Have a Sperry Technical Representative call

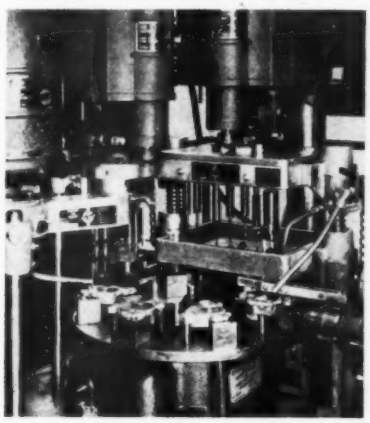
NAME_____ TITLE_____
COMPANY_____
ADDRESS_____
CITY_____ ZONE_____ STATE_____

CIRCLE INFORM-A-GRAM KEY NO. 96

SPECIAL 8-STATION MACHINE PERFORMS 16 OPERATIONS

Every nine seconds, 10 holes are drilled, four deburred, and two tapped — all at one time — in an aluminum alloy die casting on the special Ettco-Emrick 4-way drilling and tapping machine.

The part is a plate-cast stator for the magneto of a small gasoline motor. In order to meet customer's production requirements of 400 pcs/hr, Ettco Tool & Machine Co., Inc., Brooklyn, N. Y., "unit-engineered" this multiple drilling and tapping machine which consists basically of two of the company's standard vertical drill units, one vertical automatic lead screw tapping unit, and one horizontal drill unit.

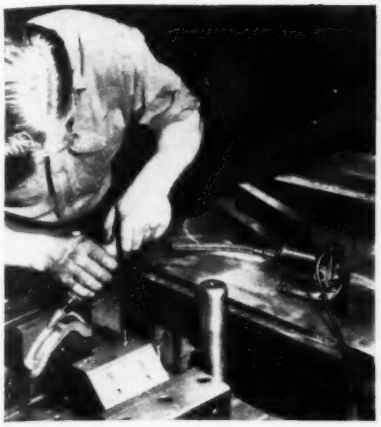


These assemblies are mounted on a standard cast iron machine base with built-in coolant tank and pump. Electrical controls and wiring conform to J.I.C. standards. Tooling for the part consists of an 8-station Ettco-Emrick index table with eight nests to receive the parts.

Operation of this special machine is simple. The operator unloads one part and reloads another in the load station over two locating pins. He then presses a button which sends an electrical impulse to the index fixture. This indexes the loaded part to the work stations and also, through a limit switch within the index, actuates the four units simultaneously to perform the necessary drilling, reaming, deburring, and tapping operations.

After the machining cycle has run its course to produce one completed part, all units automatically return to start position and the cycle is repeated.

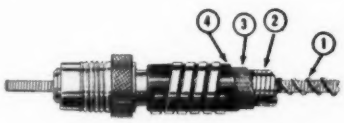
BUY U.S. SAVINGS BONDS TODAY



New Hand Tool Gives Tool And Die Maker More Efficient Performance

At the Modern Tool and Die Company, Cleveland, extremely close tolerances are a constant requirement in the daily production activities. Workmen must have hand grinding tools which provide cool operation over long periods, vibration-free performance, flexibility and efficiency in use, and minimum handling fatigue.

According to the Shop Foreman, the latest hand tool that has all these advantages is the Dumore Super-Flex shaft tool. "We like it because it takes all our ¼" and ⅛" shank tools and performs extremely well on our close tolerance tool and die work. Even after day-long use, worker fatigue is practically non-existent. It has cool operation and is vibrationless. The 22,000 rpm output gives us ample speed for clean, fast, precision metal removal. It is the handiest, most efficient hand tool we have."



BUILT-IN EFFICIENCY

Bronze liner encircles the shaft (1) which acts as a bearing and confines rotation within a definite radius. It prevents vibration, whipping and acts as lubricant to the shaft. The armored wire casing (2) is surrounded by wire braid (3) for further insulation and covered with neoprene (4) which is oil, grease and water resistant. For further information on the Super-Flex and other precision hand tools, write to the Dumore Company, 1304 Seventeenth St., Racine, Wis. ADV.

Low Cost Precision Grinding Machines

made possible with versatile, all-purpose SERIES 5

DUMORE TOOL POST GRINDERS

MOUNTED ON USED MILLER BASES, the Series 5 Dumore Tool Post Grinders provide manufacturer, Scully-Jones, Chicago, with dependable high production precision grinding equipment at amazingly low cost.

As the plant manager says, "Over many years' use we have learned to expect very close tolerances, low scrap and trouble-free operation from our Dumore Grinders. The extremely low depreciation, maintenance and set-up costs make this unit one of the most satisfactory tools in the plant. As long as Dumore Grinders and serviceable used machine tools are available we need never lack for precision grinding equipment."

Series 5, Dumore Tool Post Grinder, ½ hp distributed field, continuous-duty rated universal motor. Speeds from 4600 to 42,500 rpm for wheels from ⅛" to 5". Performs a wide variety of internal and external grinding jobs at high production rates. Accuracies to .0001" and surface finishes of 6 to 8 micro-inches. For lathes with 13" to 18" swing . . . and . . .

Mounts on any basic machine tool — planers, shapers, mills, grinders, lathes — to provide precision grinding equipment at low cost. Simplified mounting makes change-over quickly — and speeds re-converting to original machine, when required. You can improvise, too, to make low cost special machines for special jobs!

Eight other models available, 1/5 to 3 hp, for every size of basic machine and type of grinding job. For complete details, write for Catalog 55-FL.

WARNING: If you own a Dumore Tool Post Grinder — don't let it sit idle in your tool crib! It's the most versatile, useful tool you own. Put it to work **now** — you'll save money and get better results!

SOLD THROUGH LEADING DISTRIBUTORS EVERYWHERE

You can do more grinding with Dumore Grinders on **any** machine tool!

DUMORE

AUTOMATIC DRILL UNITS TOOL POST AND HAND GRINDERS

PRECISION TOOLS

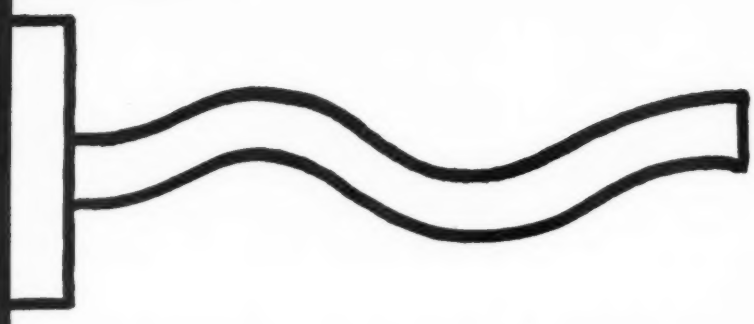
1304 Seventeenth Street, Racine, Wisconsin

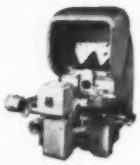
CIRCLE INFORM-A-GRAM KEY NO. 97

DROODLES

by ROGER PRICE

J&L





Bench Model BC-7D

Floor Model FC-30

Floor Model FC-14

Table Model TC-14
(Vertical Inspection)

"T-SQUARE FOR WOOZY DRAFTSMAN"

My designing uncle, Claude, invented this while working for the Biggs Chest-Wig Corp., makers of "Thorax-Thickets." The idea hit him during the annual Company Party. Unk, a fast man with a grape, was in rare form. He had just defenestrated the Accounts Receivable ledgers, and was launching into his famed take-off on Old Man Biggs, when the latter appeared. During the ensuing conversation, Claude bent his T-square over the Biggs cranium, and mankind was enriched by a new invention. Since then, C. has gone on to bigger and better things. He now owns a distillery, making "Tipple-Tot," the children's whiskey. A grand idea . . . wish I'd thought of it first!

Another thing I should have thought of first is the Optical Comparator, made by my friends, Jones & Lamson. The J&L O.C., as I familiarly call it, is a marvelously versatile instrument that is used for measuring and inspecting all sorts of parts and objects of various sizes and shapes. It is speedy and accurate (to .0001") and cuts inspection costs to the bone. The J&L Comparator is equally suited for both production-line and job-shop work, and it performs inspections that just aren't possible by any other method. Get the full details . . . send this coupon *today!*

JONES & LAMSON OPTICAL COMPARATORS *On the Job . . .*

A customer writes: "The J&L Optical Comparator has enabled us to reduce costly man-hours in inspection time. We are also able to accurately inspect work that previously would have been impractical. A typical case: We had a 1,840,000 piece job requiring accurately drilled .043 dia. holes ⅜" deep in 1020 steel. Drill "breakage" was excessive and hole straightness difficult until the Comparator enabled us to easily inspect all drills for precisely ground points and .0005 per inch straightness."

"The originator of machine tool standards in optical inspection"

JONES & LAMSON

JONES & LAMSON MACHINE COMPANY, Dept. 710, 519 Clinton Street, Springfield, Vt., U. S. A.

Please send me Comparator Catalog 402-C, which describes the complete line of J&L Optical Comparators.

name _____ title _____ street _____

company _____ city _____ zone _____ state _____

CIRCLE INFORM-A-GRAM KEY NO. 98

SCREW MACHINE ASSOCIATE NAMES COMMITTEE HEADS

Clarence A. Button, president of the National Screw Machine Products Association, announced recently the names of 15 newly appointed committee chairmen. They include: Technical Research & Standards Committee, Daniel F. Viles, Waltham Screw Co., Waltham, Mass.; Cutting Fluids Subcommittee, Dana B. Jefferson, Walker Mfg. Co., Medfield, Mass.; Technical Handbook Subcommittee, C. J. Baumgart, Screw Machine Engineering Co., Chicago.

Edwin B. Krause, Ostby & Barton Co., Providence, Machine Tool Committee; David Gilchrist, Mueller Brass Co., Port Huron, Mich., Industrial Relations; Gene P. Hopkins, Nelson Stud Welding Co., Lorain, Ohio, Employee Incentive.

E. E. Sandifar, Omco Products Corp., Springfield, Ohio, Committee on Statistics; John S. Meaden, Meaden Screw Products Co., Chicago, Insurance; William J. Fleming, Cleveland District Office of the Aluminum Company of America, Public Relations; and Arthur K. Oldin, J. J. Tourek Mfg. Co., Chicago, Sales Conference Committee.

CHROMIUM CARBIDE PATENT ASSIGNED TO FIRTH STERLING

William W. Wellborn, Manager of New Products Research & Development at Firth Sterling, Inc. has been granted a patent on the manufacture of chromium carbide grades CR-1 and CR-2.

Assigned to Firth Sterling, the material is characterized by its high hardness at room temperature as well as temperatures to 2000° F, coefficient of expansion relatively nearer that of steel than other cemented carbides, resistance to chemical attack over a wide range of temperatures and ability to take an exceptionally fine finish which produces a significant reduction in its coefficient of friction.

This combination of characteristics is responsible for their extensive use for hot extrusion die inserts, trim for various chemical process valves, plastic molding dies, gage blocks and plug gages, rotary seal assemblies, parts for high temperature service in either oxidizing or reducing atmospheres and similar applications.

NOW . . .

high efficiency

Filters, Regulators, and Lubricators for Air Supply to Pneumatic Equipment

with the NEW

WATTS high efficiency LINE

consisting of:

WATTS high efficiency FILTER

New TORNADO ACTION

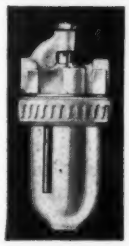
Contoured inlet eliminates drastic air pressure drop and forces the air into a downward spiral. This "Tornado Action" sets up centrifugal force which spirals dirt and moisture particles downward into the "quiet zone."

WATTS high efficiency REGULATOR

New ASPIRATOR ACTION

Watts Aspirator control acts directly on input valve, giving instant compensation for fluctuating pressure demands . . . provides precise control and stabilizes pressures reaching individual pieces of equipment.

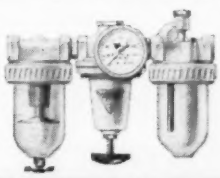
WATTS high efficiency LUBRICATOR



New BY-PASS PICKUP

Watts new By-Pass Pickup makes possible an exclusive high velocity venturi section which vaporizes virtually 100% of the metered oil. By-Pass permits maintenance of constant pressure in the venturi section with minimum pressure loss.

Complete range of Sizes: 1/4", 3/8", 1/2"



BOWLS CAN BE REMOVED IN 30 SECONDS

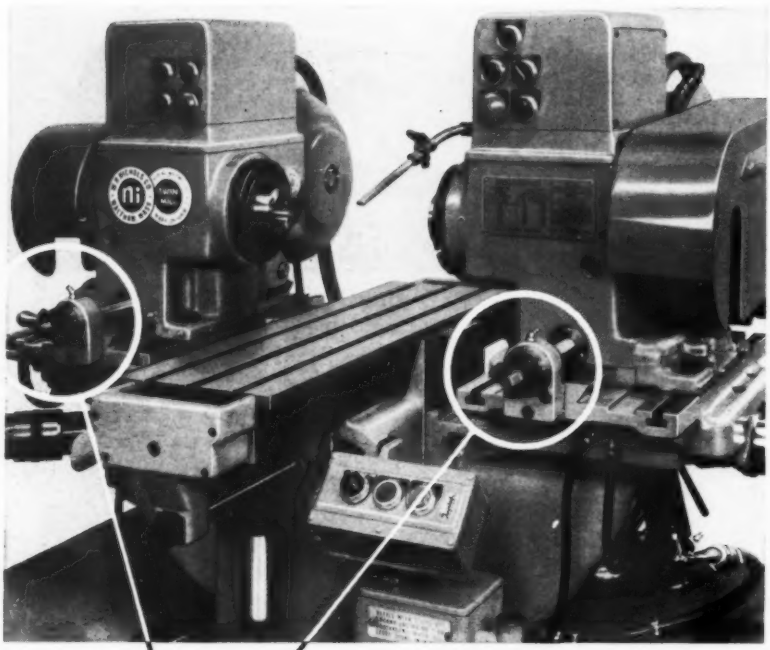
Write for catalog and specification sheets on WATTS high efficiency line.

WATTS REGULATOR COMPANY

SINCE 1875

14 EMBANKMENT ROAD LAWRENCE, MASSACHUSETTS

CIRCLE INFORM-A-GRAM KEY NO. 99



NICHOLS TWIN MILL...
SOMETHING NEW HAS BEEN ADDED

Now, the Nichols Twin Mill offers dovetail slides with micro-feed screws for *longitudinal* adjustment of milling heads, as well as transverse and vertical screw adjustments. With this new feature, the Nichols Twin Mill provides SIX-WAY ADJUSTABILITY FOR EACH MILLING HEAD IN SECONDS!

Adaptable for long or short-run jobs. The scope of Nichols Twin Mill utility is limited only by the imagination of the user.

THINK: Two geared milling heads—each completely independent with independent drives, push button controlled. Wide range of spindle speeds—55 to 2050 R.P.M. Vertical Head available for either or both spindles. Automatic Table cycle with rapid approach, hydraulic-controlled variable cutting feed and rapid return.

THIS MEANS: The Milling Heads may be directly opposed or offset longitudinally, vertically or transversally. Ferrous or non-ferrous materials can be milled with HSS or carbide tipped cutters. IT ALL ADDS UP to top production with fine finish while TOLERANCES TO TENTHS are maintained with ease.

Complex light milling jobs can be milled faster and more economically with the Nichols Twin Mill. "Two Heads are better than one—for sure".

WRITE OR PHONE FOR FULL DETAILS—CATALOG.

Manufactured by W. H. NICHOLS COMPANY

National Distributors

THE ROBERT E. MORRIS COMPANY

5007 FARMINGTON AVE. • WEST HARTFORD 7, CONN.

CIRCLE INFORM-A-GRAM KEY NO. 100

Will You Be There?

Jan. 16-18. Society of Plastics Engineers, Inc. 13th Annual Technical Conference. Sheraton-Jefferson Hotel, St. Louis, Mo.

•

Jan. 17-18. 1957 Engineers Joint Council General Assembly. Statler Hotel, New York City.

•

Jan. 21-25. American Standards Association. Gaillard Seminar on Industrial Standardization. Engineering Societies Bldg., New York City.

•

Jan. 21-31. Engineering and Management Course. University of California, Los Angeles.

•

Jan. 24-25. "Automatic Coding" Digital Computer Symposium. The Franklin Institute, Philadelphia.

•

Jan. 28-31. Plant Maintenance & Engineering Show. Public Auditorium, Cleveland.

•

Jan. 29. Cutting Tool Manufacturers Association. Annual Business Meeting. Detroit Yacht Club, Detroit.

•

Jan. 30-31. American Society for Engineering Education. Ninth Annual College-Industry Conference. University of California, Los Angeles.

•

Jan. 30-31. Armour Research Foundation and Chicago Chapter of American Welding Society. Third Annual Midwest Welding Conference. Chicago.

•

Feb. 1-2. Ninth Annual Industrial Engineering Institute, University of California, Los Angeles.

•

Feb. 5-7. 12th Annual Technical and Management Conference of the Reinforced Plastics Division of The Society of Plastics Industry, Inc. Edgewater Beach Hotel, Chicago.

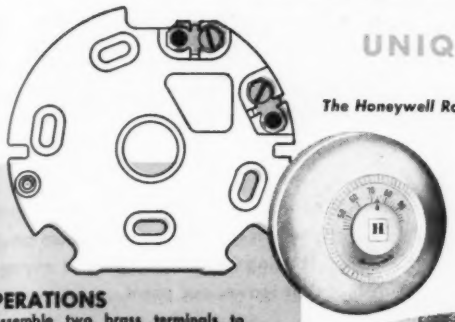
•

Feb. 19. 13th Annual Quality Control Clinic. Rochester Society for Quality Control. War Memorial, Rochester, N. Y.

Vascoloy-Ramet throw-away carbide inserts are now packaged in transparent plastic cases for better carbide protection, quick identification and easy use. Their design assures that fumbling, dropping, carbide chipping and breakage is reduced to a minimum. Inserts never touch each other in the rigid, durable cases.

Bodine CASE HISTORY NO. 40

UNIQUE TOOLING SAVES 90% LABOR



The Honeywell Round

OPERATIONS

Assemble two brass terminals to plastic back plate. Tap 3 holes—auto-feed & insert two screws. Inspect for screws & terminals.

PRODUCTION DATA

Previous method, 8.5 hours labor per 1M assemblies. New method, 0.81 hours labor. 7.69 labor hours saved per 1M assemblies. Machine time 1500 cycles per hour. Acceptability of production 94%.

Minneapolis-Honeywell's attractive room thermostat depends upon this unique tooling set-up for economical volume production of the plastic back plate terminal block assembly shown at left. Labor hours have been reduced to about ONE TENTH of previous operations, thanks to this Bodine 42-30 Machine. It's just one example of the versatility of Bodine machines as they lend themselves for special tooling to meet specific job requirements.

UNUSUAL TOOLING FEATURES: This complete assembly is now made in one cycle of a Bodine 42-30 Machine. The two presses stamping the terminal blanks are coupled to and cycled by the machine, feeding stampings continuously as shown. Terminals are cut-off, inserted and formed over at station one. Back plates are magazine fed. Operator's functions are largely limited to keeping back plate magazine filled and replenishing coils of brass stock on presses.

At end of operation, two inspection probes, advanced from below, test for properly filled screw terminal holes, automatically discard rejects.

With today's demand for cost-saving through grouping of assembly operations, Bodine's extensive experience in the field will prove profitably useful. We invite inquiries. Send your ideas and samples for analysis to Dept. TP-1.

"You Can't Meet Tomorrow's Competition With Yesterday's Machine Tools."

THE Bodine CORPORATION
BRIDGEPORT CONNECTICUT
AUTOMATIC DIAL TYPE DRILLING, MILLING, TAPPING, AND SCREW INSERTING MACHINES

CIRCLE INFORM-A-GRAM KEY NO. 101

"HARTFORD SPECIAL" A

COMPLETELY TOOLED MACHINES
ready to produce on your floor

Automatic production and parts processing machinery is our business. 45 years of designing and building experience go into every machine tool that leaves our plant.

The dependable volume and consistent economy of Hartford machines is the direct result of our development and use of standard, production tested machine components.

For p
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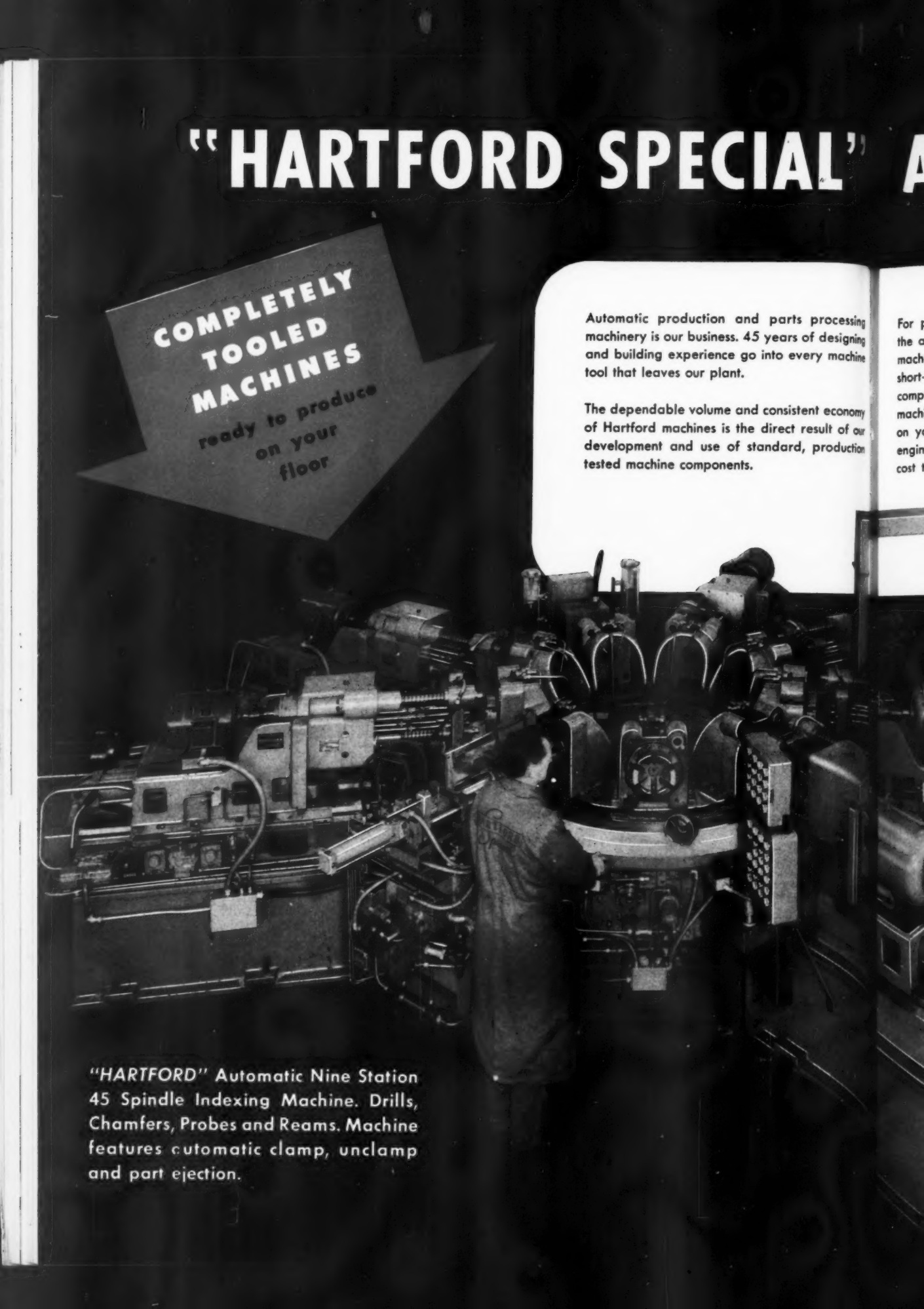

"HARTFORD" Automatic Nine Station 45 Spindle Indexing Machine. Drills, Chamfers, Probes and Reams. Machine features automatic clamp, unclamp and part ejection.

L" AUTOMATIC EQUIPMENT

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nachine

conomy
of our
duction

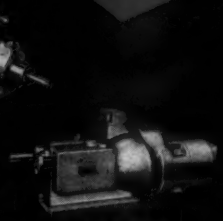
For plants with long-run high production jobs the answer is Hartford's automated production machines . . . for plants requiring diversified short-run production, the answer is Hartford's complete range of "building blocks", standard machine components which can be assembled on your floor to fit the job. Consult Hartford engineers for both — better products at lower cost through better methods will be the result.

"HARTFORD" ALSO BUILDS AUTOMATIC THREAD ROLLING MACHINES AND THE WORLD FAMOUS SUPER-SPACER

STANDARD MACHINE COMPONENTS

ready for assembly into production machines on your floor

QUILL TYPE AIR HYDRAULIC DRILL UNITS



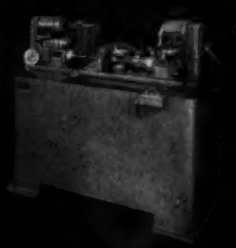
QUILL TYPE LEAD SCREW TAPPING UNITS

QUILL TYPE CAM UNITS

MACHINE BASES

WAY TYPE HYDRAULIC FEED UNITS

AUTOMATIC INDEX TABLES



"Hartford" double end drilling machine assembled completely from standard components -- Drill Units, Base and Cabinet.

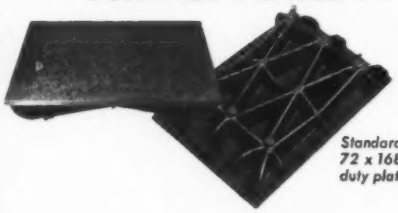
HARTFORD *Special*

MACHINE TOOL DIVISION
THE HARTFORD SPECIAL MACHINERY CO.
2921 HOMESTEAD AVE., HARTFORD 12, CONN.

Today's Standard in Precision Surfaces

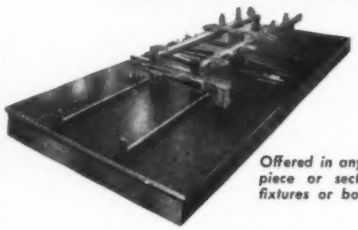
MACHINE PRODUCTS

SURFACE PLATES . . . Specially heat treated cast iron to eliminate distortion and to insure dimensional accuracy . . . triangular rib supported to resist load deflection . . . finished to exacting precision specifications . . . ample top thickness to permit resurfacing operations.



Standard sizes from 7 x 7½ to 72 x 168. Extra large and heavy duty plates also available.

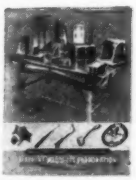
FLOOR PLATES . . . May be utilized for either layout or fixtures . . . features an adjustability of .002" in any direction . . . offers the convenience of 2" clamping ledges on both sides and ends. And, if desired, cast iron plates can be furnished with machined scribed lines.



Offered in any size up to 10' x 20' in one piece or sections. Quotations on plates, fixtures or both furnished on request.

LAYOUT PLATES . . . Designed to facilitate layout work . . . flawlessly surfaced to meet today's precise requirements in inspection . . . ruggedly constructed to permit mounting of unit heads for machining operations.

Standard sizes: 36 x 72, 36 x 96, 36 x 150. Other sizes on request.

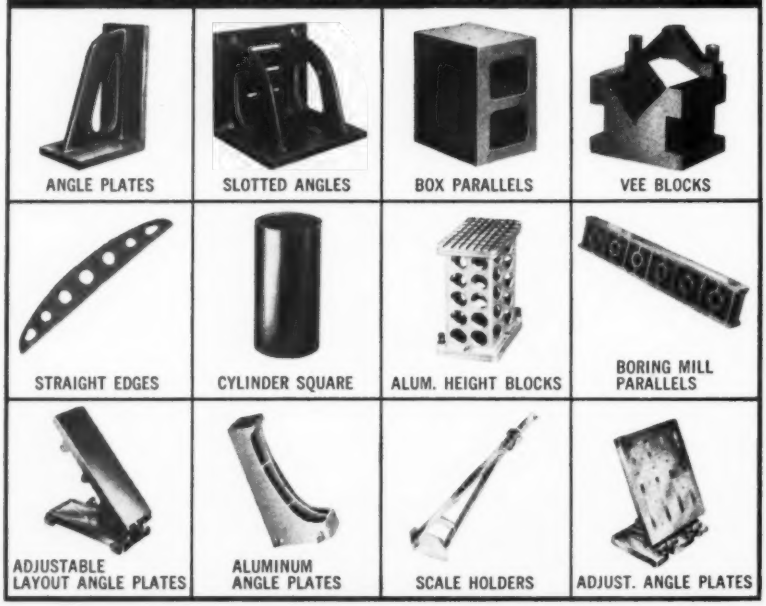


Facilities also available to recondition worn equipment to your "specs."

Free! Catalog containing descriptions, specifications on Machine Products plates and accessories.

MACHINE PRODUCTS *Corporation*

6771 E. McNICHOLS ROAD • DETROIT 12, MICHIGAN



CIRCLE INFORM-A-GRAM KEY NO. 104

PRODUCTION UP - - COSTS DOWN - - WITH "THROW-AWAYS"

A new record in machining rate has been established by one manufacturer, with costs cut to one-third in step turning SAE 4140 heat-treated (320 Brinell) drive shafts. The record was made after changing from standard brazed-tip carbide tools to Kendex "throw-away" insert tooling.

Originally a style AR-16 tool was used with .0144" feed, 173 sfpm, and ¼" depth of cut. Five pcs/cutting edge were turned and 40 pcs/tool.

With the Kendex style KTAR-16C positive rake triangular insert tool, made by Kennametal Inc., Latrobe, Pa., feed was reduced to .0117" and speed was increased to 325 sfpm. Depth of cut was unchanged. Although the increased speed and reduced feed tend to offset each other, the resultant rate of metal removal is 1½ times as great. Longer tool life and reduced downtime for changing cutting edges permitted the faster production rate.

Cost difference resulted largely from elimination of grinding. Cost of grinding brazed tools totaled $7.00 at $1.00/grind. This plus tool cost added up to $11.04 or 27c/pc turned. Cost of the Kendex tool was $2.71: $1.45 for the insert, and $1.26 for the holder, prorated on the basis of 1/10 of holder price, thus giving a cost of 9c/pc turned.

NEW INDUSTRIAL ELECTRO-HYDRAULIC MACHINE CONTROLS

A new transistorized servo amplifier and an electro-hydraulic servo valve make possible electro-hydraulic control of industrial machinery.

The two new "building block" components were designed by the Machine Controls Division of Minneapolis-Honeywell Regulator Co. They combine the best features of electronic signal sensing with hydraulic control of variable delivery pumps, hydraulic motors, cylinders, and similar equipment.

The use of electronic "brains" and hydraulic "muscles" has heretofore been primarily limited to controlling anti-aircraft guns, tank turrets, aircraft guided missiles and in other military applications.

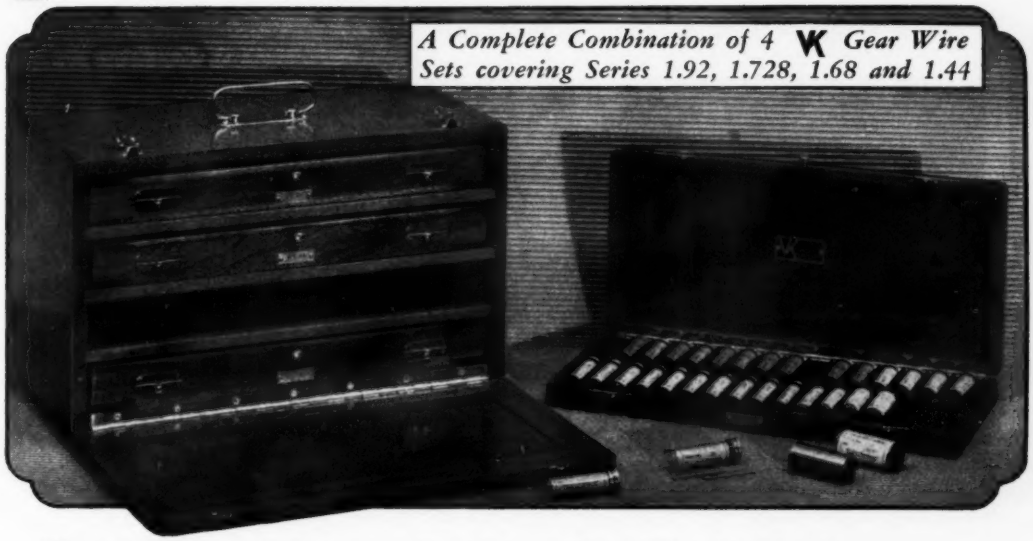
According to Honeywell engineers, the amplifier (known as XRJ301A) and the electro-hydraulic servo valve (XVJ300A) make it practical to apply hydraulic power to many appli-

. . . *Continued on Page 106*

VK

Set No. 84

GEAR MEASURING WIRES



Illustrated above is the newest Van Keuren Gear Wire Set No. 84

Set No. 84 is a multi-purpose set designed to cover a range of 26 diametral pitches from 2 to 80 with wires from each of four different and popular wire series:— 1.92, 1.728, 1.68 and 1.44. Because of duplication of wire sizes, this set which would normally involve 104 sizes reduces to 84 sizes. The economy here is evident.

The latest VK Gear Measuring Tables, available in Catalog and Handbook No. 36, have been arranged for use with all four of these gear wire series. Thus the set can be used in conjunction with the tables in many ways, such as:

Tooth Thickness — Measuring *tooth thickness* of internal and external spur gears, splines and serrations.

Involute Profile — Checking *involute profile* by using more than one wire size. Series 1.92, 1.728 and 1.68 for externals. Series 1.68 and 1.44 for internals.

Helical Gears — Measuring *helical gears* when normal diametral pitch is one of the 26 for which the set was designed.

Enlarged Pinions & Reduced Gears — Measuring *enlarged pinions* and *reduced gears*. (tables are now available for the first time in VK Circular G38, giving measurement values and change factors for reduced gears which mate with pinions enlarged in accordance with the latest American Standard covering involute fine pitch gears).

Complete information regarding the use of gear measuring wires is contained in a fifty-page section of the VK Catalog and Handbook No. 36. Included in this section are the most complete gear measuring tables available, as well as all necessary formulas and equations for computing non standard spur and helical gears. Numerical examples are included. This book is available on request.

VK Gear Wires are held within .000025" for roundness and exact size. Surface finish is 1.5 RMS or better.

If complete coverage of all series is not necessary, sets covering single series such as 26 Ex. or 26 Int. are also available. See Catalog No. 36.

VK

38th YEAR

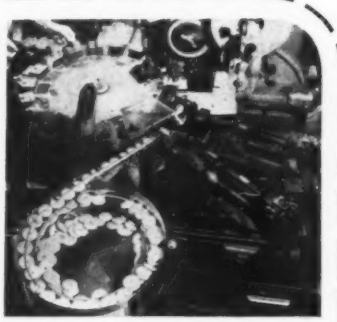
THE Van Keuren CO.

171 WALTHAM STREET, WATERTOWN, MASS.

Optical Flats . . . Light Wave Equipment . . . Light Wave Micrometers . . . Gage Blocks . . . Wire Type, Taperlock and Trilock Plug Gages . . . Master Setting Disks . . . Thread Measuring Wires . . . Gear Measuring Wires . . . Carbide Plug Gages . . . Laps and Surface Plates . . . Precision Lapping Service.

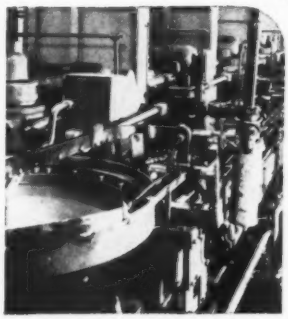
CIRCLE INFORM-A-GRAM KEY NO. 105

Convert a monotonous manual task into an automatic operation - - With



SYNTRON

PARTS FEEDERS



If you want automatic, oriented position and single line feeding of small parts — SYNTRON PARTS FEEDERS will do that and, at the same time increase production and eliminate the time and costs involved in manual feeding.

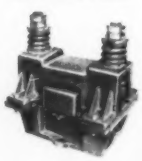
Rate of parts flow can be controlled by merely turning a dial to increase or decrease the rate of flow of parts discharge.

It emphatically increases the speed and accuracy of any production operation. Almost every kind of material may be handled — metal, wood, plastic, rubber, ceramic, glass, etc.

Use SYNTRON PARTS FEEDERS if you want MORE production at LOWER cost.

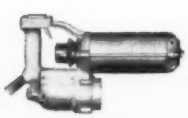
Other Syntron Equipment of proven dependable Quality

ELECTRIC VIBRATOR



VIBRATORY FEEDER

ELECTRIC HAMMER



Write for complete data — FREE

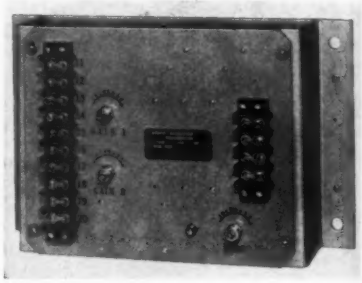
SYNTRON COMPANY

341 Lexington Avenue Homer City, Pa.

CIRCLE INFORM-A-GRAM KEY NO. 106

. . . New Controls from Page 104

cations previously limited to electric drives. They also provide precision control of existing hydraulic equipment which could not previously be controlled automatically.



The fully-transistorized amplifier is designed to receive signal inputs from any standard 60-cycle a-c signal source. The user can provide manually variable controls, can make the control source a function of position, velocity or other command variable, or can utilize input signals from tracers or computers. The amplifier is designed for parallel summation, ratio comparison, or series summation of input signals. Output is designed to power a balanced single load, or split loads, of as high as five watts.

The amplifier supplies the driving power for the new electro-hydraulic, three-way servo valve which, in turn, controls the flow of oil to hydraulic linear or rotary motion drives. The single stage servo valve is driven by a high performance torque motor and is available in ratings up to 10 gpm, and 3,000 psi.

Linear motion control can be applied to hydraulic presses, reciprocating drives used in planers, grinders, or saw mill carriages, and in a wide variety of straight line positioning applications. Rotary motion applications include lead screw feeds, spindle drives, and processing machinery which requires precise control of shaft rotation.

Control combinations possible with the new electro-hydraulic servo "team" include stroke control feedback, pressure or flow feedback, and feedback of load position, velocity, force, torque, etc.

ACME Automatics provide effective solutions to problems of automatic finishing!

ROTARY • RECTANGULAR • STRAIGHT LINE AND SEMI-AUTOMATIC MACHINES

for POLISHING AND BUFFING • MICRO-FINISHING • WIRE BRUSHING AND DE-BURRING

•**Please** *send blue prints or, preferably, finished and unfinished samples of the part to be finished, together with detailed information on present finishing operation and production requirements for recommendations and quotations.*

LEADERSHIP FOR NEARLY 50 YEARS

SPECIAL MACHINERY amc AUTOMATIC BUFFING MACHINES

ACME Manufacturing Co.

1400 E. 9 MILE RD., DETROIT 20 (Ferndale) MICH.

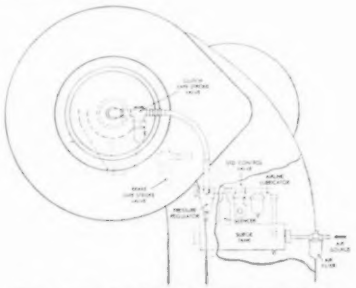
Builders OF AUTOMATIC POLISHING AND BUFFING MACHINES FOR NEARLY HALF A CENTURY

CIRCLE INFORM-A-GRAM KEY NO. 107

NEW SAFETY DEVICE PREVENTS PRESS FROM "REPEATING"

The Clearing Saf-Strok control is a system designed to prevent a press from "repeating". This is the dangerous condition — which could result from some air, electrical or mechanical failure in the press — where the slide continues to stroke even though the run buttons have not been depressed.

The Saf-Strok developed by Clearing Machine Corp., Chicago 38, is used in addition to normal press operating controls and may be installed on a Clearing press before delivery or it may be installed on presses now in operation.



The key device in the circuit is a limit switch that is activated if the press crankshaft accidentally goes beyond its normal stopping point. The switch is usually set so that 5° to 10° of crankshaft overtravel will actuate the switch and stop the press.

Two 3-way solenoid valves are installed in the air line, one near the clutch, the other near the brake. Both valves are normally open so that when the press is operating safely they have no effect on the machine. However, should the crankshaft overtravel to the point where the limit switch is set, both valve coils will be energized simultaneously. The valves will close and immediately exhaust the clutch and brake of air. When this happens, the clutch disengages and the brake engages. The slide stops instantly.

Once the valves have been energized, a red indicating light goes on and the press cannot be operated until a button is pressed to open the safety valves. The safety light is a positive signal to the operator that trouble exists and should be investigated before normal operation is resumed.

Since no safety device is any good unless it is in good working order, it is recommended that the device be tested at least once each shift. This procedure will have the additional value of convincing the press operator that his equipment is safe — a factor that will be reflected in improved employee morale and increased production. A test button, when depressed, by-passes the press limit switch and causes a deliberate failure, thereby permitting the Saf-Strok to prove it is functioning properly.

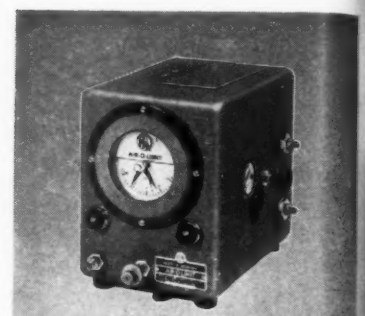
SHUTTLE TRANSFER CONVEYOR POWERED BY ELECTRIC MOTOR

This automatic shuttle transfer conveyor driven by a Spurgeon electro-mechanical drive is used to transfer engine intake manifold castings from one production operation to another.

The conveyor holds 14 castings, each weighing approximately 40 lbs, and delivers them automatically to a preload station of a transfer machine, which it feeds. The speed of the transfer conveyor is designed for twice the speed of the transfer machine so as to keep the transfer machine loaded, even though an empty space be left on the transfer conveyor by the machine feeding it.

The Spurgeon electro-mechanical drive utilizes an electric motor for shuttling a ball-bearing nut on suitable screw at a specified speed. The ball-bearing nut is connected to a conventional bar, equipped with collapsible dogs. These dogs push the manifolds along steel ways, on the forward stroke, and collapse under the manifolds on the return stroke. At the end of the return stroke the dogs right themselves again and push the manifolds forward on their forward stroke.

The Spurgeon Drive, built by Spurgeon Company, Van Dyke, Mich., eliminates the need of air cylinders, oil cylinders, oil pumps, air and oil piping with their consequent control valves and solenoids.



BUILD A GAGE INSTALLATION TO SUIT YOUR NEEDS . . .

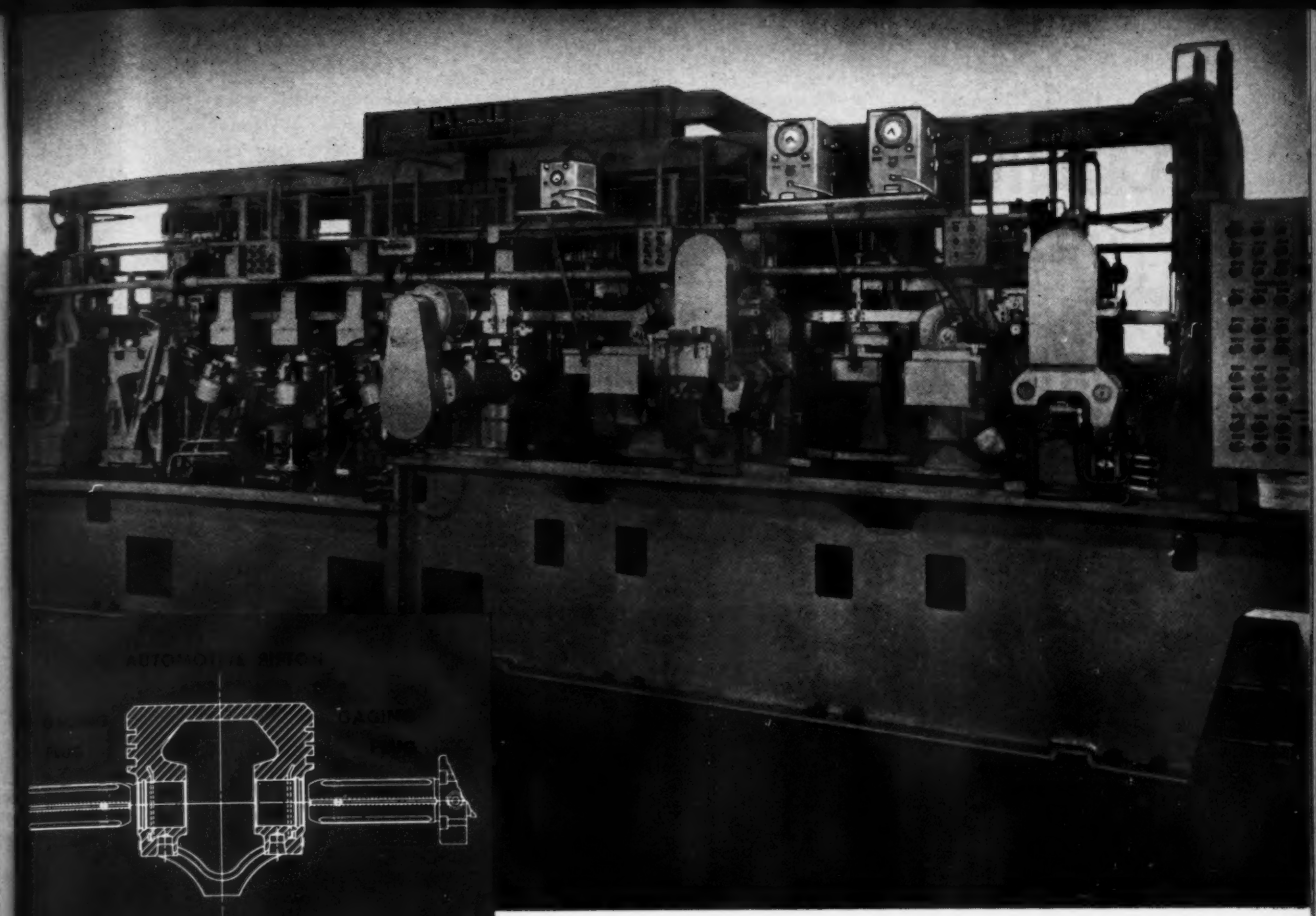
with these packaged, on-the-shelf P&W Air-O-Limit Light Signal Units. Can be used to signal operator or to provide feed-back impulse for fully automatic process control.

BASIC 2-LIMIT UNIT . . . indicates high and low tolerances. Suitable for sorting and other "yes-or-no" control applications.

3-LIMIT UNIT . . . especially suited for grinding and similar operations. Indicates or automatically controls such conditions as: "Fast Feed," "Slow Feed," and "Spark-Out."

4-LIMIT UNIT . . . similar to 3-Limit Unit, but provides greater control scope. Indicates or controls such conditions as: "Approach High Limit," "High Limit," "Approach Low Limit" and "Low Limit."

CIRCLE INFORM-A-GRAM KEY NO. 109



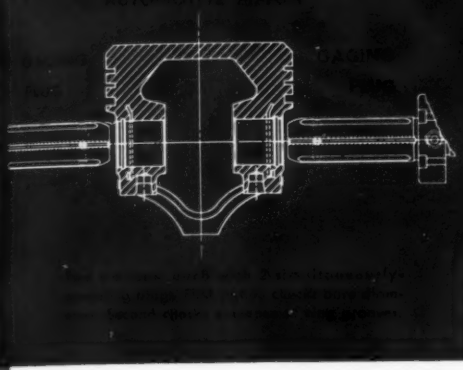


PHOTO COURTESY OF LASALLE TOOL, INC., DETROIT, MICHIGAN

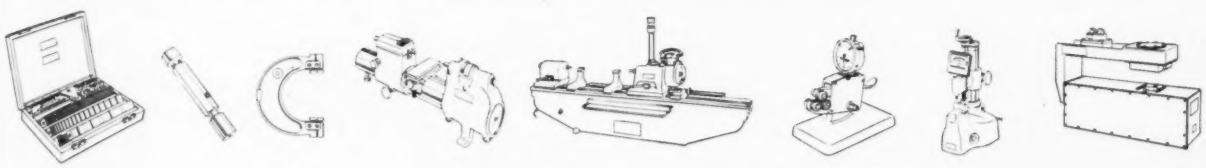
Help Yourself to Increased Output

WITH PRATT & WHITNEY STANDARD, ON-THE-SHELF GAGE CONTROL UNITS

INCREASED OUTPUT RATES, INSURED ACCURACY, REDUCED REJECT LOSSES . . . are the benefits you get with On-Machine Automatic or Automation Gaging! And now, these standard P&W Packaged Units . . . with appropriate tooling . . . can provide an installation tailored to your needs *without* the expense or delays required to engineer and construct special controls.

For example, these P&W Packaged Units made it easy to provide automatic on-machine gaging for this special, high-speed automotive piston machine produced by LaSalle Tool, Inc. Two P&W Air-O-Limit Carbide Gage Plugs are arranged to check the ID of both wrist pin bores on the pistons automatically. Lights on the P&W Control Units signal the operator if tolerances are exceeded. A second set of gage plugs similarly checks bores for the presence of snap ring grooves. If desired, control units can be arranged to shut down the machine automatically when an imperfect part is detected. Whatever *your* requirements, P&W can supply gaging equipment exactly right for the job.

For complete information, write to Pratt & Whitney Company, Incorporated, 15 Charter Oak Boulevard, West Hartford, Connecticut.



GE BLOCKS . . . CONVENTIONAL GAGES . . . SUPERMICROMETERS . . . STANDARD MEASURING MACHINES . . . COMPARATORS . . . AUTOMATION AND CONTINUOUS GAGES

PRATT & WHITNEY

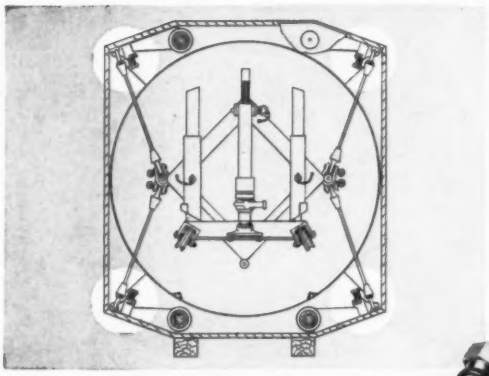
FIRST CHOICE FOR ACCURACY

MACHINE TOOLS • GAGES • CUTTING TOOLS

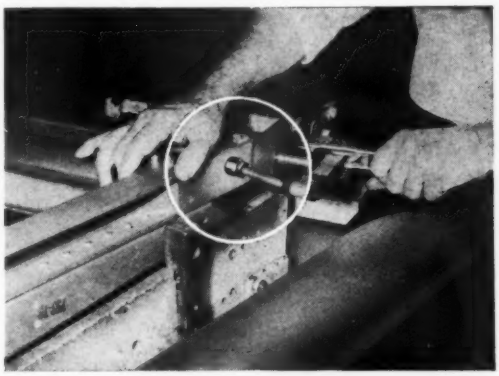
CIRCLE INFORM-A-GRAM KEY NO. 109

TOOLING IDEAS your shop can use!

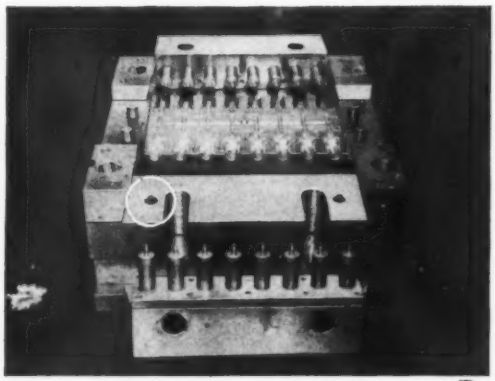
Shown below are just a few of the many uses for Vlier tooling accessories. Although these standard accessories are primarily used in jigs and fixtures, many companies are using them to replace custom-made devices in original equipment.



SPECIAL SWIVEL-PAD CLAMPS for a missile container manufacturer incorporate the remarkable Vlier ball-joint construction. Eight Swivel-Pad Clamps are used to release tension on cables which suspend the missile in its shipping container. This particular model withstands 21,000 load pounds.



CLAMPING PARTS WITH OFF-ANGLE SURFACES is no problem when Vlier Toggle Pads are used with a toggle clamp as shown here. The pad swivels 10° each side of the center line, assuring solid clamping of the part with no damage to the surface.



THIS 16-CAVITY, SIDE-ACTION PLASTIC MOLD uses four Vlier S-66 Spring Plungers as *detents* to lock the side-action bar in its travel to the center of the mold, eliminating costly, custom-made detents formerly used.

New Head Design

on all Vlier Torque Thumb Screws protects working parts from dirt, chips, and other foreign matter. Truarc ring makes disassembly easy. In all Vlier Torque Thumb Screws the ball-check is perpendicular to the screw axis, preventing uneven wear and wobble.

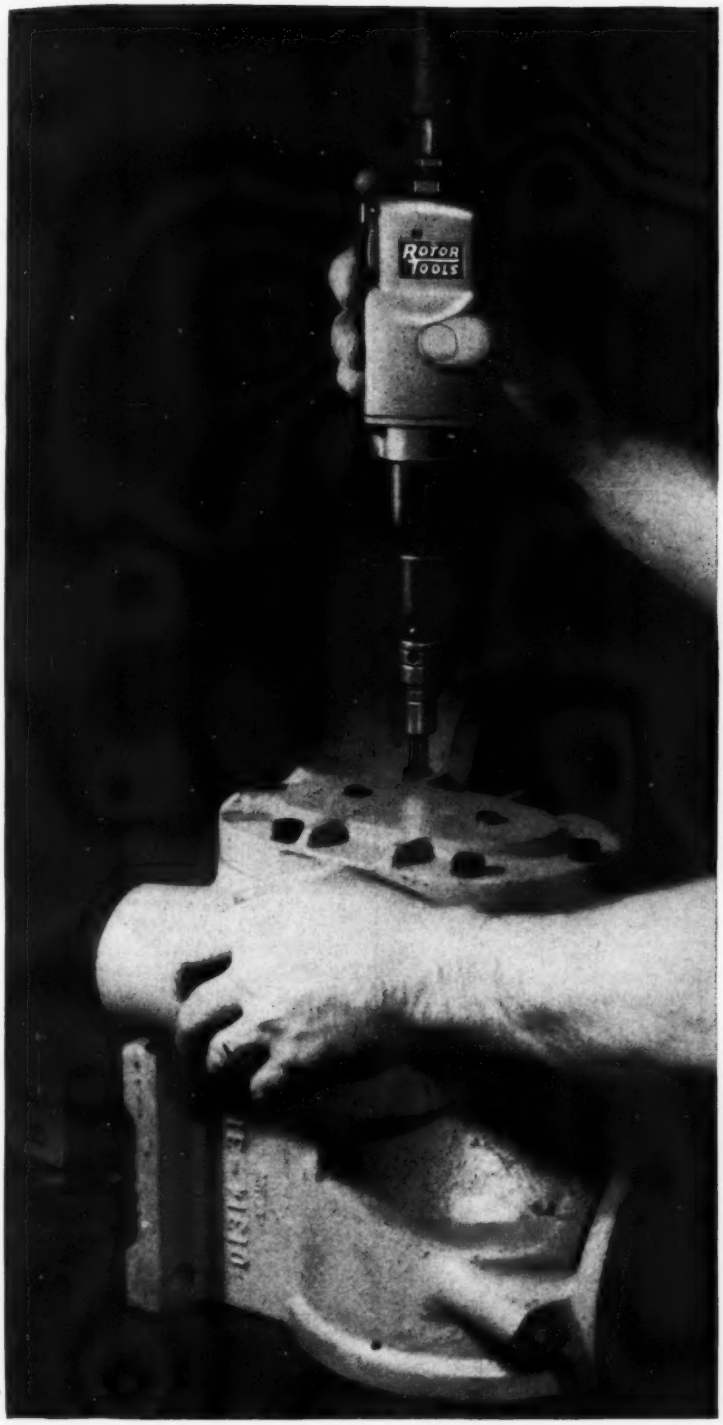
A glance at the new 1956 Vlier catalog will probably suggest many applications in your shop where you can standardize on Vlier accessories. Write for your free copy today.

VLIER ENGINEERING INCORPORATED

8900 Santa Monica Blvd., Los Angeles 6[illegible] California

Insist on Vlier Tooling Accessories... there's still no substitute [illegible] qual

CIRCLE INFORM-A-GRAM KEY NO. 110



Replaces 4 tools...

Sets nuts 30% faster

● *Application:* This new *Rotor J-2-L Impact Wrench* with a quick-change chuck does the work of four former tools. By snapping in different adapters, the operator can change quickly from a screw to a bolt or nut. *Result:* 30% faster assembly, less operator fatigue, uniformity of assembly.

Ask for a demonstration or trial of these and other Rotor portable tools to see how they can cut *your* costs! Get Bulletin 41 on the J-2-L. The ROTOR TOOL Company, Cleveland 32, Ohio.

Here's the Right TOOL for YOUR job!

Assembly Tools . . . Drills . . . Small Wheel Grinders . . . Straight Grinders . . . Vertical Grinders . . . Scalers . . . Chippers . . . Rammers

ROTOR TOOLS®
CLEVELAND, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 111

SHOP AIDS

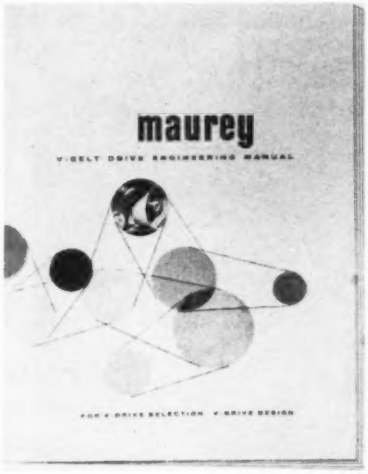
An Engineering File on Deep-Hole Drills can be obtained from The High Standard Mfg. Corp., Hamden, Conn. Presented is general information and photos of typical installations. The file also contains diagrams and specifications of the various types of deep-hole drills. In addition, details on drill tip and shank construction, sharpening instructions, a typical machine setup and a drawing of a method of adapting a deep-hole drill to a turret lathe are found in the engineering file. **Circle No. C1.**

"Moly-Sulfide Lubricant Additive" summarizes the lubricating characteristics of Moly-Sulfide-containing lubricants as demonstrated by standard tests. Data is given to show that the additive lowers wear rates of metal surfaces under extreme conditions, increases load capacity and extends the life of lubricants. In addition, the bulletin describes the additive's applications along with technical information on its chemical and physical properties. Copies of Bulletin Lu-6 are made available by Climax Molybdenum Co., Dept. L, 500 — 5th Ave., New York 36, or — **Circle Inform-A-Gram No. C2.**

Casting Design as influenced by foundry practice is covered in a 64-page bulletin. It treats the form of design, the method of making the pattern and molding procedure. Also detailed are the characteristics and behavior of the metal in the mold and other elements involved in the production of sound engineering castings. In addition, a comprehensive discussion of 11 general design rules is presented. Meehanite Metal Corp., 714 North Ave., New Rochelle, N. Y., will supply copies of Bulletin 44, or — **Circle No. C3.**

"Automatic Cleaning and Maintenance of High-Precision Antifriction Ball Bearings" is a comprehensive report that has been released by Blackstone Corp., Jamestown, N. Y. It describes the results of tests in meeting the requirements for low torque in these ball bearings and the application of low-frequency ultrasonics equipment to the problem. Application techniques and an automatic handling device have been developed based on the results of 10,000 tests that were conducted.
Circle Inform-A-Gram No. C4.

V-Belt Drives are detailed in a new engineering manual announced by Maurey Mfg. Corp., Publications Div'n, 2915 S. Wabash Ave., Chicago 16. The first section, "V-Drive Selection," is devoted to drive service factors, instructions on how to select a stock drive and complete V-belt



drive tables. The drive design section lists drive service facts and provides "how to design" instructions and data. In the general information section are found data and facts of interest to the V-drive user and designer. Copies of this V-Belt Drive Engineering Manual can be obtained from the company, or — **Circle Inform-A-Gram No. C5.**

A Carbide Grades Chart has been published by Chicago-Latrobe, 411 W. Ontario St., Chicago 10. It contains carbide grade recommendations showing grades and numbers of 12 manufacturers. Copies are made available by the company, or — **Circle Inform-A-Gram No. C6.**

Information on 37 Standard Casting Alloys is presented in a comprehensive wall chart. Described are brass, bronze and nickel silver casting alloys; their Navy, S.A.E., A.S.T.M. and Federal specification designations; and the chemical composition by percentages of ingredient metals. Direct requests for copies of the wall chart to Henning Bros. & Smith, 91-127 Scott Ave., Brooklyn 37, N. Y., or — **Circle Inform-A-Gram No. C7.**

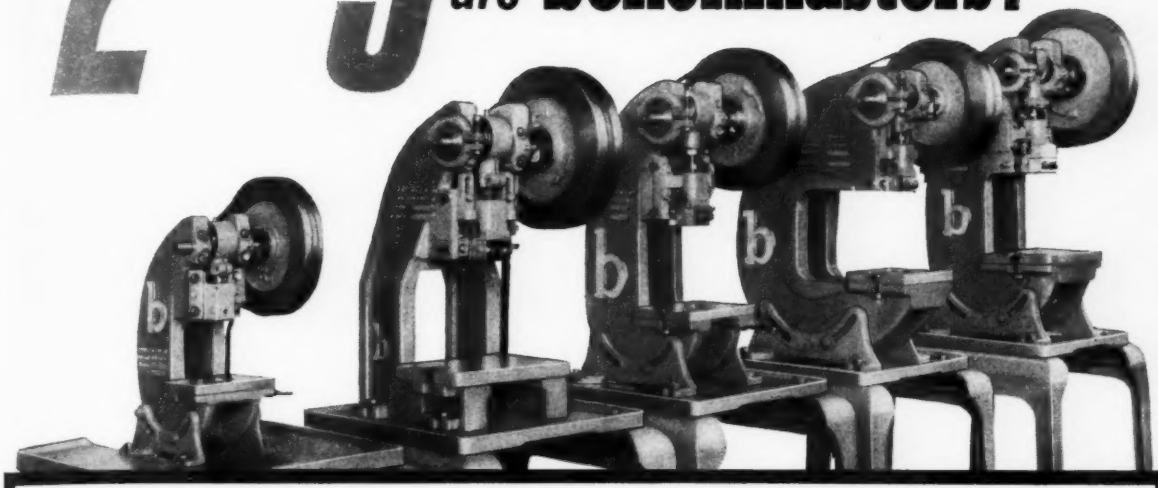
A Speed-Feed Chart contains speeds and feeds for Diamonite oxide cutting tools. Given are the Brinell hardness number, sfpm speed, ipr feed and machinability ratings for various types of materials within nine classifications. Among the classifications included in the chart are plain carbon and alloy, heat-treated alloy and tool steels; cast iron; cold drawn nickel, copper, aluminum and magnesium alloys and plastics. United States Ceramic Tile Co., Diamonite Products Div'n, Canton 2, O., will make available copies of the chart, or — **Circle Inform-A-Gram No. C8.**

A New "Selec-Tic" Welding Shop Wall Chart of 150 low temperature welding alloys is now available from Eutectic Welding Alloys Corp., Technical Information Service, 40-40 — 172nd St., Flushing 58, N. Y. Listed are torch and arc welding applications for cast iron, copper and copper alloys, stainless steels, nickel and nickel alloys, aluminum, impact, wear and corrosion resistant overlays and for metalworking jobs. Also featured are "rod-by-rod" bonding temperatures and tensile strengths. Request copies of Chart TIS 2616 from the company, or — **Circle Inform-A-Gram No. C9.**

A Heat Treating Data Book contains specifications, characteristics, applications and details on heat treating practice. Also covered are the types of furnaces and capacity, and furnace atmospheres. Included are tables of weights and melting points, hardness conversions and conversion of C and F scales. Also given are equilibrium curves. Copies of the data book are provided by Sunbeam Corp., Stewart Industrial Furnaces Div'n, 4433 W. Ogden Ave., Chicago 23, or — **Circle Inform-A-Gram No. C10.**

A General Purpose Control and Application Manual explains what each product is, shows how the product works, and tells where the devices can be applied. Covered are manual, magnetic and reduced-voltage starters; push buttons; relays; limit switches; solenoids; pressure and vacuum, float, and plugging and anti-plugging switches. Copies are released by General Electric Co., Schenectady 5, N. Y., or — **Circle Inform-A-Gram No. C11.**

2 out of 3 small presses purchased are benchmasters!



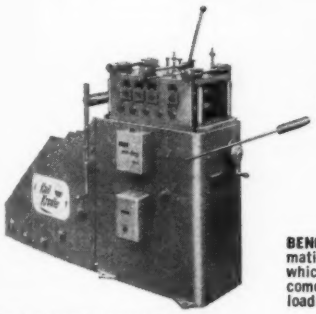
That's a fact... out of all small punch presses purchased 2 out of 3 are supplied by Benchmaster!

Being first choice by so wide a margin is no accident. First, Benchmaster builds small presses in 3 *distinct capacity ranges*... 2, 5 and 8 tons. Second, consider the various models available... *plain inclinable models, backgeared types, deep throat presses, fixed bed gap frame types, half presses, multiple ram presses and special stroke models!*

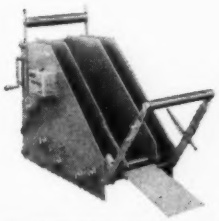
Add to this the complete range of Benchmaster Accessories... AUTOMATIC DIAL INDEX FEEDS, AUTOMATIC FRICTION ROLL FEEDS, ROLL STRAIGHTENERS, KOIL KRADLES, BARRIER TYPE GUARDS, CHUTE TYPE PRODUCTION PANS, ETC. And remember, Benchmaster's acceptance is world-wide—wherever you go there's a Benchmaster—and Benchmaster service!

When buying new presses choose the winner *First in Sales, First in Quality, First in Economy!*

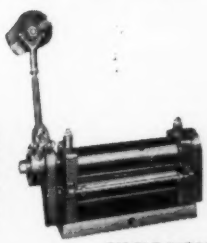
Wherever there's a press operation, this Benchmaster Equipment will cut costs, save time!



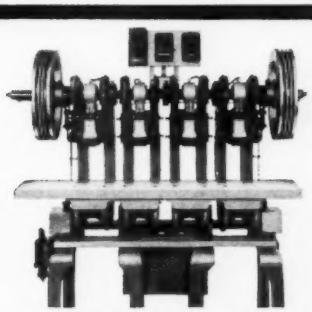
BENCHMASTER STRAIGHTENERS—(Shown in combination with Koil Kradle.) Adjustable, power driven rolls; removes kinks—straightens out coil stock before feeding to feed mechanisms or to press. Many sizes, write for details.



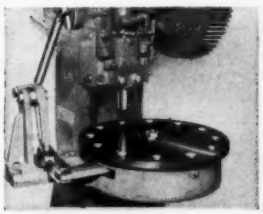
BENCHMASTER KOIL KRADLES—Automatically supplies a slack loop from which any machine can draw. Overcomes inertia of heavy coils—easier loading. Many sizes. Ask for data.



BENCHMASTER AUTOMATIC FRICTION ROLL FEEDS—A low cost roll feed made especially for all small presses. Has automatic roll lifters, feeds almost any material. Two models: 0-3" and 0-6" cutoff. 3, 5, 7 and 9" roll widths.



BENCHMASTER MULTIPLE RAM PRESSES—Any number of units required—rams can operate in unison, can alternate or can be staggered... all operate on same crankshaft... stroke lengths can also vary on each ram... separate die stages on each bed cut tooling costs, permit quick replacements. Costs ½ to ⅓ of large presses doing similar work; doubles production!



BENCHMASTER DIAL INDEX FEEDS—Links with ram, automatically indexes, placing new station under ram with each stroke. Up to 6000 strokes per hour. Cuts labor—makes your press operations almost automatic. 12" or 15" diameter tables, up to 24 stations.

FREE BENCHMASTER CATALOG! Write today!

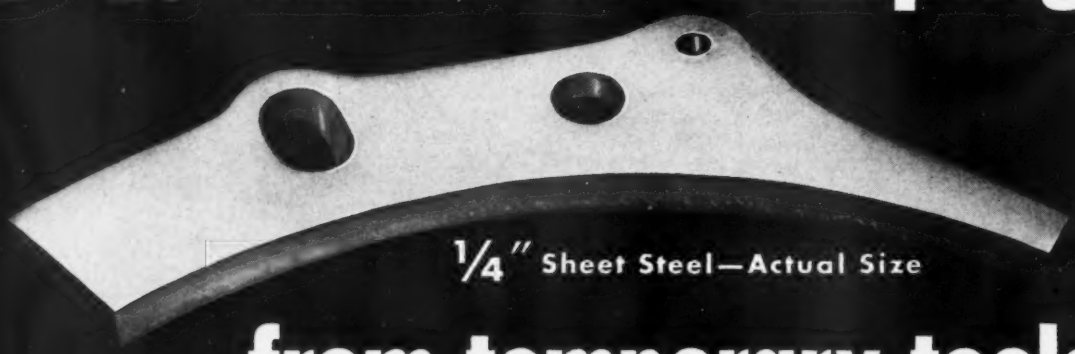
benchmaster

World's largest manufacturer of small punch presses and mills.

1835 W. Rosecrans Avenue, Gardena, California

CIRCLE INFORM-A-GRAM KEY NO. 113

D-R small lot stamping



from temporary tools *solves* a tough cost problem

Converting from casting to sheet steel stamping reduced customer's cost to 1/10 of former method

Only 200 piece parts/year were needed, and an annual design change was a further possibility. Dayton Rogers produced 100 pieces for less than the cost of the tool steel used in making a conventional die for such a part, with superior results.

GOT A DESIGN-ENGINEERING PROBLEM?

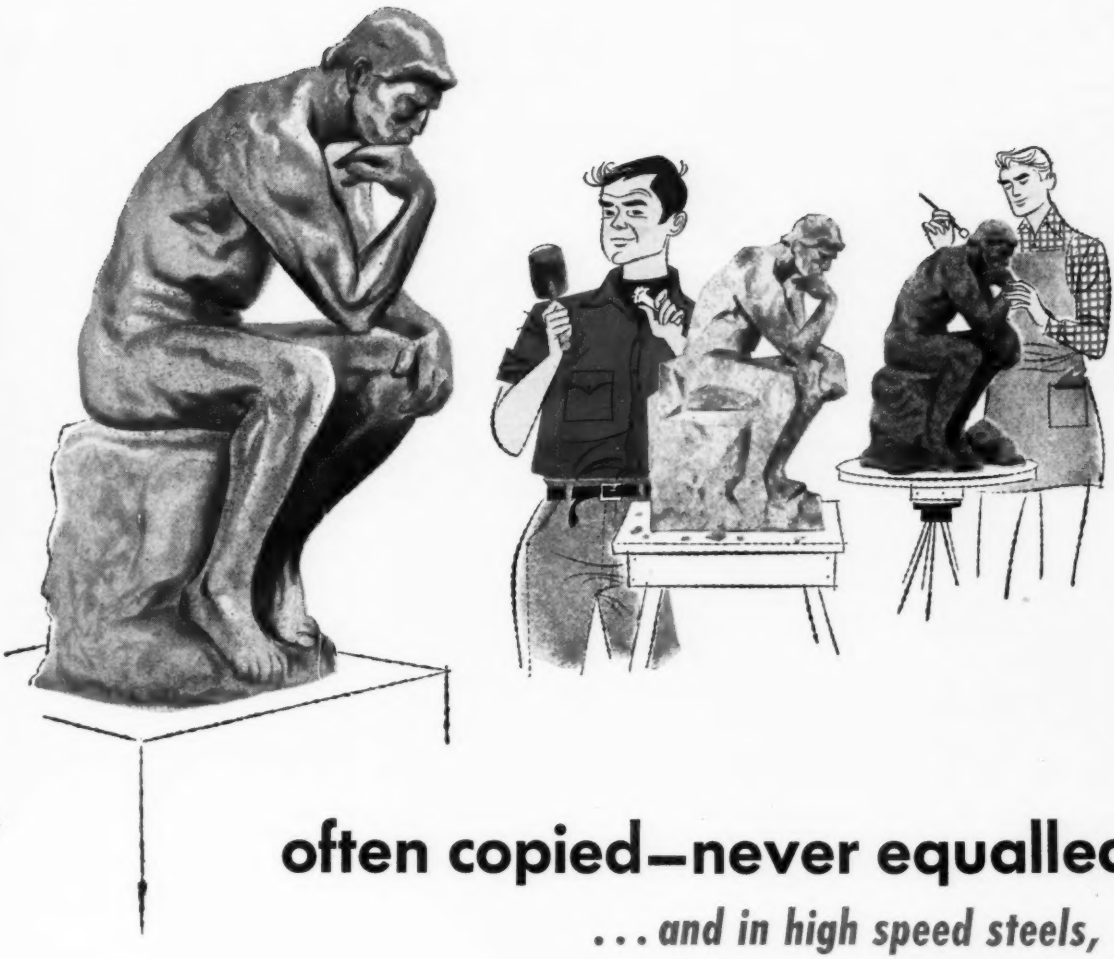
Take it up with our engineering staff. They will cost-analyze your requirements, both from the standpoint of piece-part design and quantity desired. We offer the nation's very best facilities and "know-how" for producing precision die-cut stampings in small lots. Custom-made parts of practically any design, from any stamping material, can be produced by our original short-run method at the lowest possible die cost.

SEND YOUR SKETCH, BLUEPRINT OR PART, PLUS QUANTITY, FOR PROMPT QUOTATION

DAYTON ROGERS
Manufacturing Company

MINNEAPOLIS 7B, MINNESOTA

CIRCLE INFORM-A-GRAM KEY NO. 114



often copied—never equalled

. . . and in high speed steels, nothing has ever equalled REX

Crucible's REX® high speed steel is in a class by itself—has been for more than half a century. And it gets better every year. New improvements in manufacturing techniques have brought even greater uniformity and quality to its well-known properties.

But prove this for yourself—shop-test the new REX in your own plant. Check its structure, uniformity, response to heat-treatment—all-around tool performance. Try REX any way you like—you'll see for yourself why the new REX is still the *standard for comparison* in every high speed steel application.

You can get REX from stock from your nearby Crucible warehouse—or promptly by direct mill delivery. For further information on REX and the many other Crucible special purpose steels, send for the *Crucible Publication Catalog*—it's yours for the asking. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

CIRCLE INFORM-A-GRAM KEY NO. 115

- *New Equipment*
- *New Materials*
- *New Literature*

WHAT'S NEW

Poured-In-Place Plastics are the subject of a bulletin from Nopco Chemical Co., Plastics Div'n, Harrison, N. J. Lockfoam plastics are used to provide thermal insulation, lightness and reinforcement. The bulletin illustrates and explains various applications for these plastics. Also given are the advantages and a chart of typical physical property ranges. Get your copy of the bulletin from the company, or —
Circle Inform-A-Gram No. E1.

High Heat Distortion Temperature and Long Pot Life are features of a new curing agent for epoxy resins developed by Smooth-On Mfg. Co., 572 Communipaw Ave., Jersey City 4, N. J. This hardener caled Sonite No. 41, is used for epoxy potting and encapsulation. Castings will set or gel rapidly at temperatures as low as 60°C and can be removed from the mold and postcured for optimum properties.
Circle Inform-A-Gram No. E2.

BIG—FAST AND ECONOMICAL

HERE'S the finest metal cutting band saw available anywhere today... and, at the lowest price. The big, rugged Johnson Model J easily and accurately handles 10" rounds, 18" flats—affords a quick, simple set up plus entirely automatic operation. Beautifully designed and engineered, yet a brute for work, the versatile Model J is immediately available in the standard wet or dry models to suit your needs.

The big, dependable Model J will cut *anything* in your stock pile—faster and more accurately. See for yourself, how much time, labor and production dollars you can save with a Johnson saw.

SPECIFICATIONS

Capacity—10" rounds, 18" flats
Motor—½ H. P. Ball Bearing any voltage available, single or polyphase (¾ H. P. on wet machine)
Wheel Diameters—16"
Floor Space—66" x 31"
Bed—11" wide, 44" long, 6" deep, 24" high
Overall Height (Closed)—39"
Blade Length—11' 5" x ¾" x 032" All Standard blades of these specifications can be used.
Weight—Approximately 750 lbs. Crated 800 lbs. Boxed for export 875 lbs.
Speeds—35, 90, 130, 190 feet per minute
Casters—Optional at slight extra cost

OTHER MODELS AVAILABLE

Other nationally popular members of the Johnson line of metal cutting Band Saws include the 5" x 10" capacity Model "B" (wet or dry), the unique versatile mobile Model "M" and the Johnson Adjustable Stock Stand.

Johnson
MANUFACTURING CORPORATION
1015 Barnes St., Albion, Michigan

Eastern Distributor
R. J. R. Kelly Co.
Hale Bldg., 519 Main St.
East Orange, N. J.

Mid-Western Distributor
W. Q. Lundmark
75 N. Broadway
Des Plaines, Illinois

Western Distributor
Hastings Distributors
1605 Solano Avenue
Berkeley, California

CIRCLE INFORM-A-GRAM KEY NO. 116

Intended to Widen the Uses of Epoxies for casting, laminating, encapsulating and other purposes are two new Maraset resins that have been added to the line produced by Marblette Corp., 37-31 - 30th St., Long Island City 1, N. Y. No. 636 rubber-like resin is a tough, flexible compound with high dimensional stability, resistance to heat and chemicals, excellent recovery characteristics and good adhesion to many materials. Plaster of paris forms can be used to produce low-cost castings from this resin in unlimited thicknesses and a wide range of hardnesses. Resin No. 650 is a low-irritant formulation combining the desirable characteristics of rigid and resilient epoxies. It is furnished in opaque colors for a diversity of tool and die applications. Technical bulletins giving further information and working instructions are available on request from the company, or —
Circle Inform-A-Gram No. E3.

An Automatic Transfer Molding Press has been designed for thermosetting plastics. Model 99-A which uses general purpose powder that doesn't need preheating, is suited to economical molding of small parts required for miniaturization in electric and electronic components. Get Bulletin T-756-P from Hull-Standard Corp., Abington, Pa., or —
Circle Inform-A-Gram No. E4.

The Features, Advantages and Applications of vacuum and drape forming machines are in a bulletin issued by Vacuum Forming Corp., 76 S. Bayles Ave., Port Washington, L. I., N. Y. Vacform equipment shapes products quickly, simply and precisely. The bulletin describing and illustrating the models that are available, also contains specifications.
Circle Inform-A-Grfam No. E5.

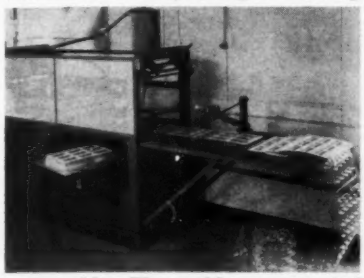
The Use of Hysol Tooling Materials in duplicating patterns is described in a technical bulletin . Emphasized is the importance of the user becoming familiar with the handling and application of Hysol epoxy pattern materials in order to profit by the many advantages of their use. These stable materials are economical, accurate and adaptable to foundry methods of producing duplicate patterns in the shortest possible time with reduced pattern cost. The bulletin deals with mold construction and preparation, and the casting and laminating processes. It also details match plates and core blow boxes. Other sections are devoted to special precautions, refacing and general information. For copies of Bulletin 24, write to Houghton Laboratories, Inc., Olean, N. Y., or —
Circle Inform-A-Gram No. E6.

IN PLASTICS?

• *Plastics Fabrication*
• *Plastic Tooling*
• *Plastics Molding*

Bonding, Laminating, Impregnating and Casting Applications are handled by Plyophen phenolic resins. A folder composed of a series of technical bulletins, details each of the resins available. The first bulletin presents a general discussion. Each of the other bulletins is devoted to one specific resin, telling its uses and listing its specifications. Get your copy of the folder from Reichhold Chemicals, Inc., RCI Bldg., White Plains, N. Y., or —
Circle Inform-A-Gram No. E7.

Versatility in Either Drape Forming or Packaging Applications is an advantage of the Skin-Pak machine announced by The Auto-Vac Co., 1987 State St. Ext., Bridgeport 5, Conn. This machine is easily converted from skin-packing to forming



over molds. The molds are mounted on the forming platform and the machine automatically cycled with different timings as in the packaging application. Using 0.010" cellulose acetate, one operator can produce three 20" x 25" formings/min.
Circle Inform-A-Gram No. E8.

Designed for Short Production Runs is a 25-ton automatic compression molding press. Model 725 is a low-cost unit for use where low mold costs and quick mold setup are desired as well as the labor savings of automatic molding. It has a universal chase plate which permits cavities to be changed quickly without taking the chase plates from the press. The bar controller provides for fast easy changeover in the molding cycle to accommodate bumping, breathing and multiple airblast. F. J. Stokes Corp., Plastics Molding Equipment Div'n, 5500 Tabor Rd., Philadelphia 20, or —
Circle Inform-A-Gram No. E9.

The Operating Features of a vertical injection molding machine are described in Bulletin 627-B from Watson-Stillman Press Div'n, Farrel-Birmingham Co., Inc., 109 Aldene Rd., Roselle, N. J. The machines are available in 1, 2, 6, 16 and 24 oz capacities. Also detailed are the advantages of the vertical method of injection molding.
Circle Inform-A-Gram No. E10.

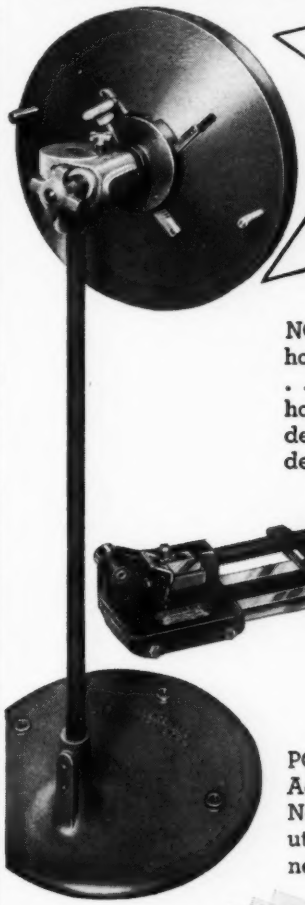
High-Speed Automatic Compression Molding Machines are the subject of a brochure from Automatic Molding Machine Co., 3217 Exposition Pl., Los Angeles 18. Automold Models A50 and A25 which are air toggle powered, are used for conventional thermosetting materials and alkyd. They produce uniform parts of high density and maintain close tolerances.

Circle Inform-A-Gram No. E11.

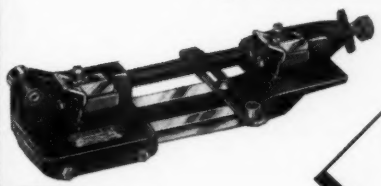
A Plastic Tooling Resin, Epoxical, is detailed in IGL Bulletin 400 published by U. S. Gypsum Co., 300 W. Adams St., Chicago 6. Epoxical is a modified, blue-colored liquid epoxy resin that will harden at room temperature without heat. Covered in the bulletin are molds and models, the laminating process, Epoxical surface coat resin, laminating of glass cloth, reinforcing laminates and the removal of laminate.
Circle Inform-A-Gram No. E12.

HITCH YOUR HITCH FEED® TO . . .

the NEW **Dickerman** *STOCK REEL!*



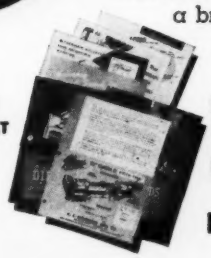
NOW, one versatile stock reel is capable of handling a wide range of standard coil sizes . . . 16", 20" and 24" and is available to handle coils up to 36" diameter. Specifically designed and "shop tested" for use with the dependable Dickerman Hitch Feed,® this new reel will easily handle all coils conventionally used with a hitch feed!



You'll be days and dollars ahead with this precision-production Hitch Feed, Stock Reel team.

PORTABLE from one press to another . . . Accommodates coils from ¼" to 2½" widths. New coils of stock may be loaded in minutes! The reel is equipped with frictionless needle bearings, is self centering, and has a brake to control de- reeling speed.

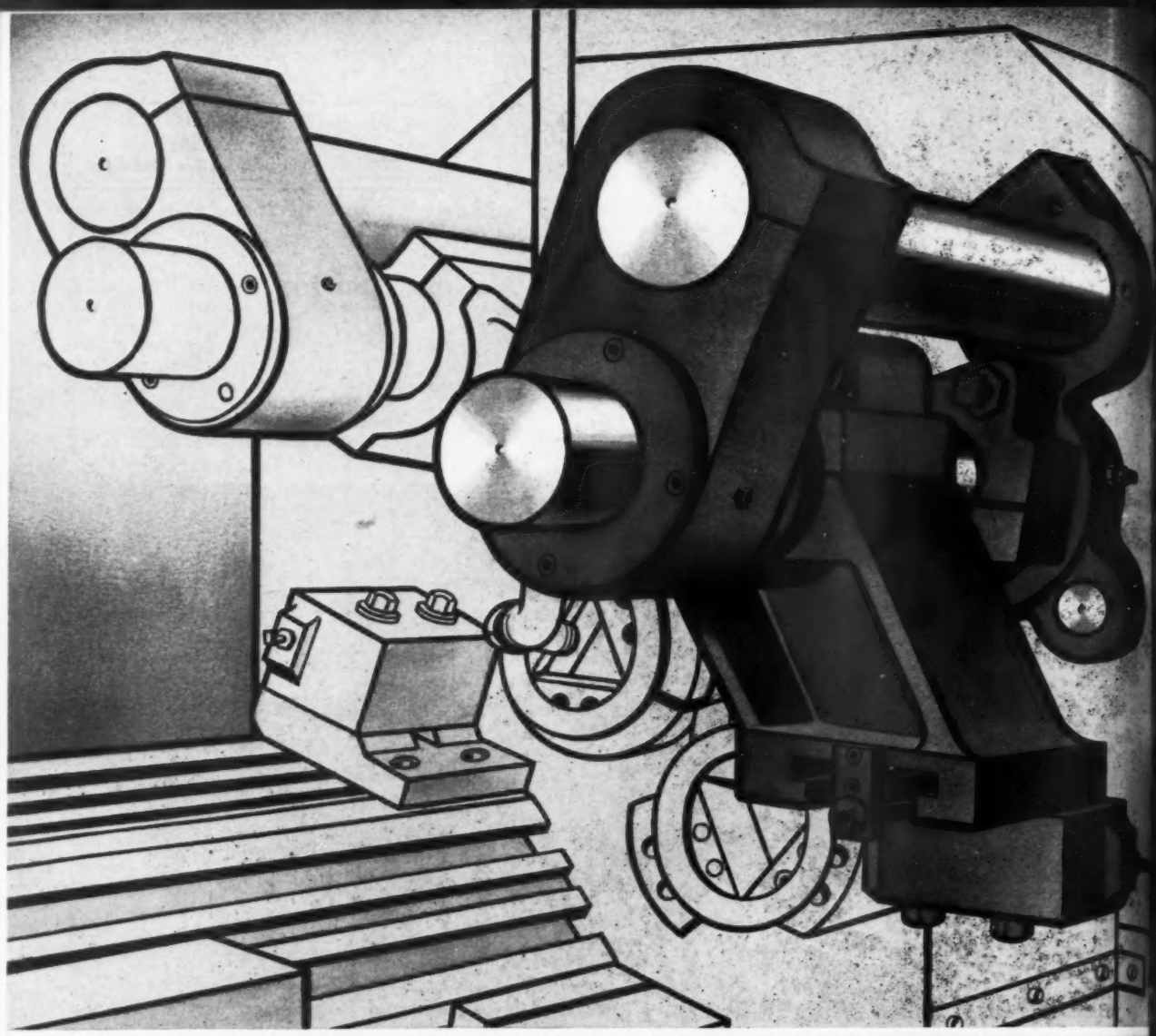
PUT AUTOMATION TO WORK—CONSULT DICKERMAN! Send for literature and prices . . . NOW!



Dickerman

H. E. DICKERMAN MFG. CO.
321-301 Albany Street, Springfield, Mass.

CIRCLE INFORM-A-GRAM KEY NO. 117



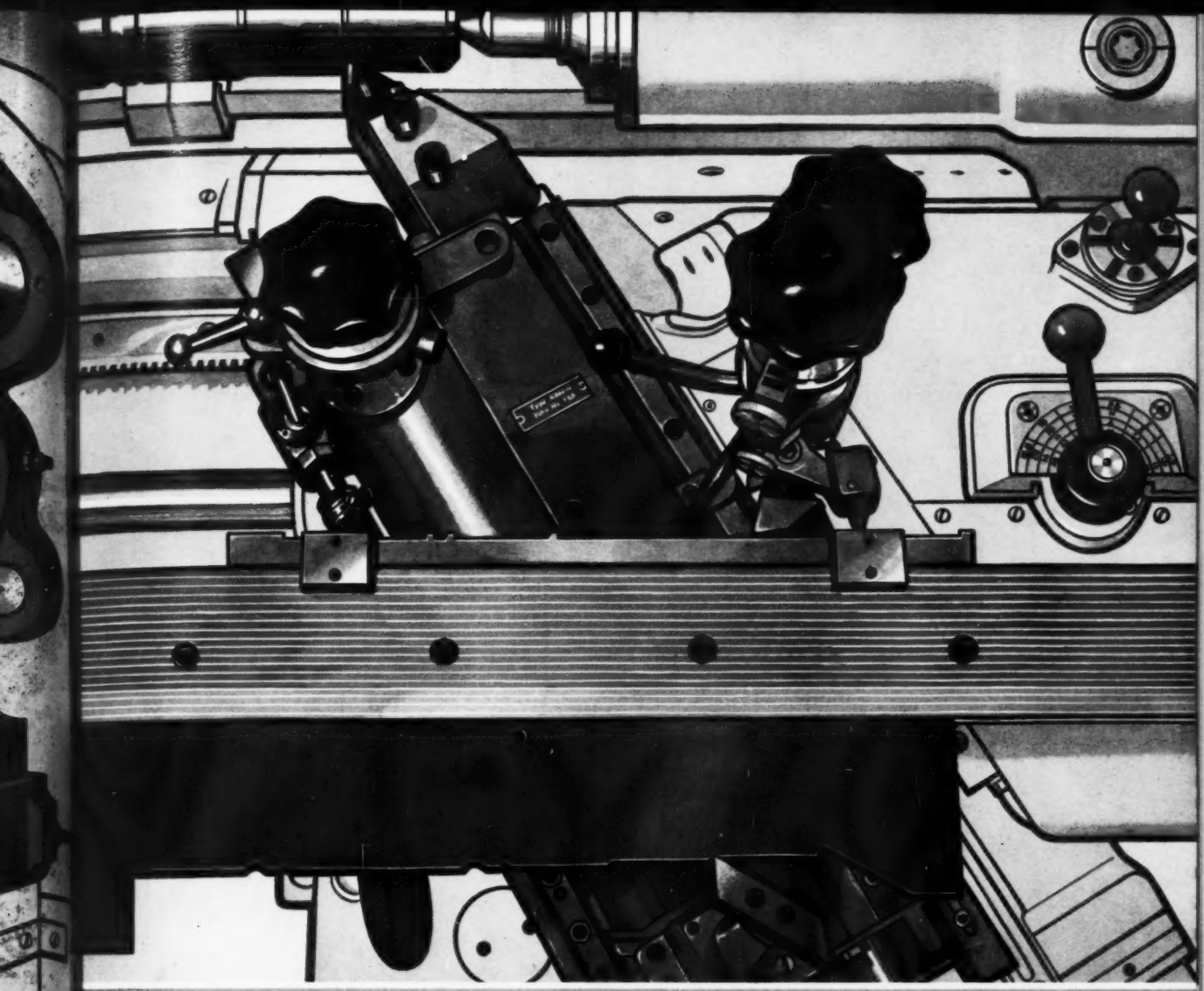
3 money-making advantages from 1 exclusive New Britain feature

New Britain's exclusive swinging arms can do everything a cross slide can do, *and*:

- You can position them for any length piece.
- You can turn O.D.'s and I.D.'s and faces with single point tools.
- You can *combine* transverse and longitudinal motions to turn tapers or radii and do recess boring.

Before you invest in automatics, check New Britains. Their "do more" principles can produce a greater return — often it's the difference between a single machining and the need for secondary operations. The New Britain Machine Company, New Britain-Gridley Machine Division, New Britain, Connecticut.

THE NEW BRITAIN MACHINE CO.
Automatic
Chucking Machine
NB



New Britain +GF+ outproduces multi-tool lathes with a single tool

How can one tool outproduce several? The answer is — maintain dimensional relationships with a template or prototype instead of a multi-tool setup. This cuts tool changeover time to practically zero.

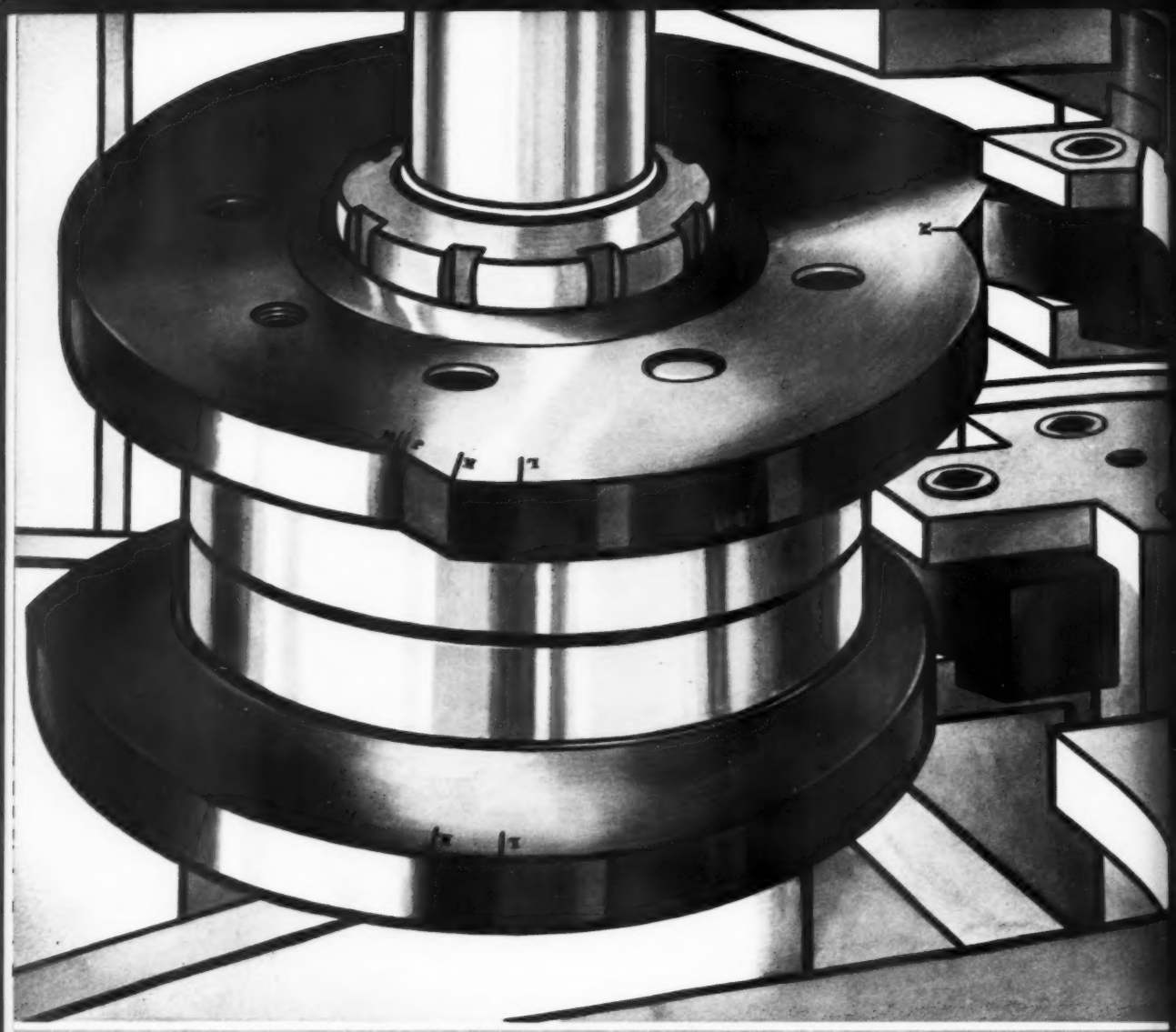
On the New Britain **+GF+** copying lathe, you can cut at maximum speeds and feeds for tool efficiency without worrying about tool wear and the delicate readjustment of several cutting tools. When the tool wears, change it, bring one dimension to size. The other dimensions have to be right. Your choice of a New Britain **+GF+** means elimination of any extra operation to bring pieces within grinding tolerances.

Machines from New Britain's three machine tool divisions incorporate the *basic principles* of more profitable production.

THE NEW BRITAIN MACHINE CO.

New Britain +GF+
Copying Lathe

NB

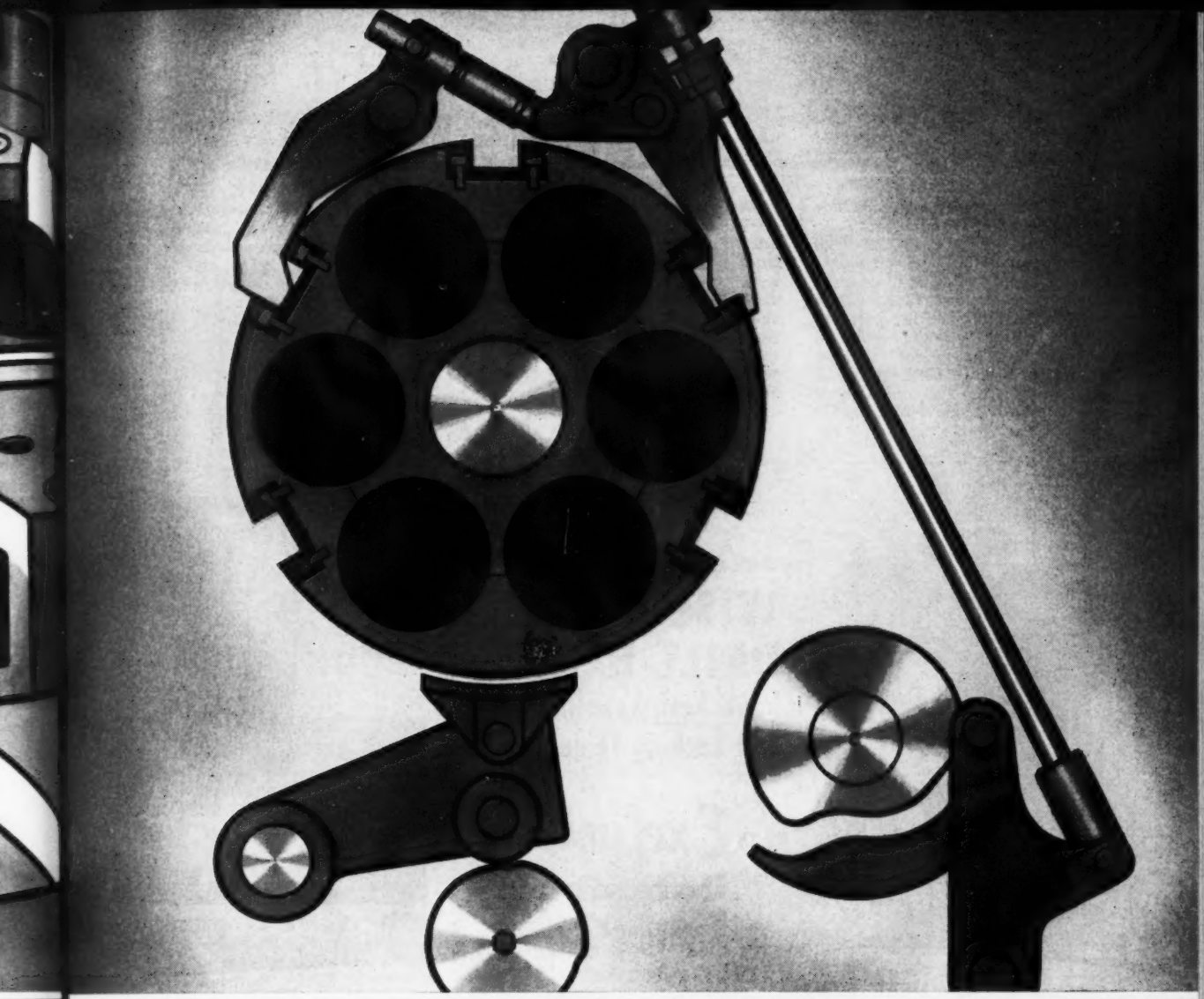


cams put the precision in precision boring

When you are working to "tenths" cams are your best method of maintaining accuracy, because cam control of the tool is *positive* control. The accuracy of parts produced on New Britain boring machines *can't* be affected by variable hydraulic pressures, ambient temperature, or play in complicated linkages.

In boring machines or *any* machine tool investment, be sure your most important requirements are met, not by gadgets, but by the fundamental design principles employed. The New Britain Machine Company, New Britain-Gridley Machine Division, New Britain, Connecticut.

THE NEW BRITAIN MACHINE CO.
Precision Boring Machine
NB



heavier, faster cuts

with accuracy

This cross section of a New Britain spindle carrier illustrates three features that assure permanent accuracy under today's constant heavy duty use.

1. Positive, accurate location of the carrier means perfect spindle alignment with the tool.
2. Rigid clamping of the carrier makes it integral with the frame during the cutting cycle, eliminating carrier weave and vibration.
3. Automatic spindle carrier lifting mechanism eliminates all wear during indexing, and so guarantees preservation of initial accuracy.

Features like these don't show on the surface — you "see" them in the form of continued accurate production, year after year. The New Britain Machine Company, New Britain-Gridley Machine Division, New Britain, Connecticut.

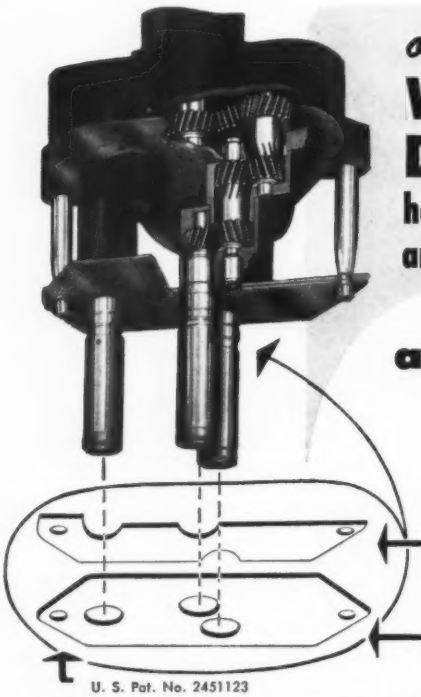
THE NEW BRITAIN MACHINE CO.
Automatic Bar Machine
NB

For Ease and Convenience Use TOOLING and PRODUCTION Inform-A-Gram Cards

Over 700 Carbide and Carbide Tipped Tools are contained in a 50-page catalog issued by Nelco Tool Co., Manchester, Conn. Each tool is illustrated and complete descriptions, specifications and prices given. Included are centers, boring bars, replacement carbide tips, diamond wheels, face mills, keyseat cutters, shell end mills, etc. Request copies of Catalog 956 from the company, or **Circle Inform-A-Gram No. B1.**

Dial Snap Gages are the subject of a bulletin from Standard Gage Co., Inc., Poughkeepsie, N. Y. Types L and D Parallocs, mechanisms for maintaining parallelism of anvil faces, are described. Also covered is the SF Type Dializer for converting an AGD adjustable limit snap gage to a dial snap gage. The company will make available copies of the bulletin, or — **Circle Inform-A-Gram No. B2.**

A Complete Line of Grinding Wheel Adapters and toolroom and grinding room accessories are shown in a new catalog. Included are four styles of adapters that can be used on over 25 different makes of surface tool and cutter grinders. Also covered are a combination spanner and socket wrench, puller bushing and screw lock washers, adapter nuts, truing arbors, quills, etc. Obtain copies of the catalog from Wm. Sopko & Sons Co., 140 E. 267th St., Euclid 32, O., or — **Circle Inform-A-Gram No. B3.**



only
WISCONSIN DRILL HEADS
have both Locating and Locking Templates

an *Exclusive* Patented Feature

1 Locating Template
Each spindle swings into half-holes of locating template for fast, accurate positioning.

2 Locking Template
Full-hole template fits over spindles, locking them into exact position.

U. S. Pat. No. 2451123

Other* Wisconsin Drill Head *Features

WIDE RANGE—Each spindle has 3 centers to provide maximum range of bolt circle adjustments. U. S. Pat. No 2441722.

LONG LIFE—Helical gears and other moving parts are hardened to resist wear.

SIZE AND CAPACITY—There are 6 models of Wisconsin Adjustable, Multiple Drill Heads, each in 2 to 8 spindles. Capacity: Wire Size thru 1½" dia. Operating Speeds to 4000 r.p.m.

STANDARD PARTS — Replacement parts for all standard models always in stock.

In addition to Standard Multiple Adjustable Center Drill Heads, Wisconsin builds Special Fixed Center Drill Heads, Lead-Screw Tapping Units, Fixture Bases, Special Machines — both Index and Transfer Type.

Write for Name of Nearest Representative

WISCONSIN DRILL HEAD CO.

4975 N. 124th STREET • BUTLER, WISCONSIN

A 8435-1P

CIRCLE INFORM-A-GRAM KEY NO. 122

For Effective Examination and Measurement of Microscopic Details, use a stereoscopic microscope. The Cycloptic Series features a Magni-Changer which "dials-in" magnifications. A wide range of models is available. For details on the models, plus illustrations, diagrams, tables and a price list, obtain a copy of Catalog SB56 from American Optical Co., Instrument Div'n, Buffalo 15, or—**Circle Inform-A-Gram No. B4.**

The Principles and Advantages of Audio Testing of Gears, either singly or in clusters, are discussed in a new bulletin. Also described are electronic audio sound testers. These testers can be used directly in automated lines, eliminating the human element in accuracy of final sound testing. Copies of Bulletin 1126 are supplied by Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, or — **Circle Inform-A-Gram No. B5.**

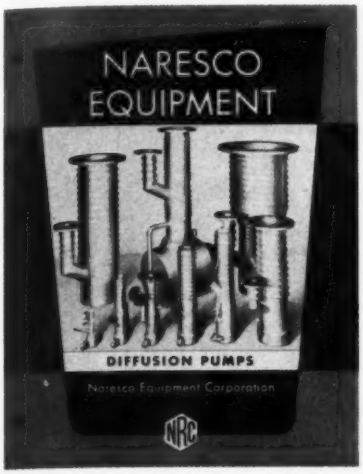
Electric Furnaces and Temperature Controllers are featured in Catalog 55 released by Thermo Electric Mfg. Co., Dubuque, Iowa. Each model is illustrated and a complete description given. Also presented are specifications. Copies of the catalog are obtainable from the company, or—**Circle Inform-A-Gram No. B6.**

PREVIEWS

Circle postage-free Inform-A-Gram Key Number for your request

TOOLING and PRODUCTION'S Inform-A-Gram Section is a CARDload of Information

High Vacuum with High Speed is provided by NRC diffusion pumps. A bulletin describes the pump, complete with a diagram showing the operating principle. Also given are



charts showing operating characteristics and range of the pumps. Each of the types available is illustrated and the specifications listed. For details, see the bulletin issued by NRC Equipment Corp., 160 Charlemont St., Newton Highlands 61, Mass., or— **Circle Inform-A-Gram No. B7.**

Hacksaws, Hole and Band Saws, and Band Knives are included in Bulletin 1053 from The L. S. Starrett Co., Athol, Mass. Each is detailed complete with illustrations, specifications, description and reference data. Also presented is general information on laboratory testing and plant facilities and helpful tables. The company will provide copies of this bulletin, or — **Circle Inform-A-Gram No. B8.**

Standard and Special Taps, Drills and Gages are featured in Catalog 56-1 issued by Beloit Tool Corp., 12000 Milwaukee Rd., Beloit, Wis. Presented are pricing formulas for determining the most economical quantities to purchase. For complete information, get a copy of the catalog from the company, or — **Circle Inform-A-Gram No. B9.**

Protective Coatings are the subject of a bulletin issued by Dip Seal Plastics, Inc., 2311—23rd Ave., Rockford, Ill. These clear and colored transparent hot melt plastic coatings give products appeal, protection and low-cost packaging. The bulletin details the advantages of the coatings. **Circle No. B10.**

Dial-O-Point Indicator Accessories are featured in a circular from Aero Screw Co., Inc., Burlington, Mass. Illustrated and described is a stand which holds 24 indicator accessories. In addition, each of these accessories is shown separately. Included are 20 contact points, a thread adapter, a top lift and two extensions. Copies of the folder are supplied by the company, or — **Circle Inform-A-Gram No. B11.**

Special Production Tools and Machines for Holes are engineered to product and plant by Hole Engineering Service, P.O. Box 4877, Detroit 19. These tools and machines will perform bearing-izing, drilling, reaming, boring and combinations. A bulletin illustrating a few typical applications to meet unusual requirements is supplied by the company, or — **Circle Inform-A-Gram No. B12.**

Recent changes and additions provide many bonus features.

Unobstructed perimeter (work from any side!)

Six Wheel Models

Capacities to 5,000 pounds.

LIFT LOWER TRANSPORT with PORTELVATOR®

The Handy HAMILTON Portable, Elevating Table

3 table surfaces 4 point support

Four Wheel Models

Special Designs tool

More Service for Less Money than Any other unit of equipment

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Write* for NEW, FREE Bulletin No. P-2408

* ADDRESS

IT'S A Hamilton Tool USE IT WITH CONFIDENCE 2408

THE HAMILTON TOOL COMPANY
832 South Ninth Street
HAMILTON, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 123

Grinding, Sanding, Polishing, Buffing, wire brushing and drilling in steel can be done with attachments by ¼ hp multi-speed or single speed flexible shaft machines. They are available with truck, pedestal, bench and suspension type mountings. Catalog 57 describing the machines and listing a complete line of accessories, and flexible tool, power drive and drill shafts, is supplied by Stow Mfg. Co., 443 State St., Binghamton, N. Y., or —
Circle Inform-A-Gram No. B13.

Illustrations of Various Bonded Bi-Metallic Applications and considerable engineering data are found in a technical brochure. The Al-Fin Process is a casting process for the molecular bonding of aluminum and magnesium casting alloys to steel, iron and other metals. Complete details are found in the brochure, "The Al-Fin Molecular Bonding Process," published by Al-Fin Div'n, Fairchild Engine and Airplane Corp., Farmingdale, L. I., N. Y., or —
Circle Inform-A-Gram No. B14.

New ALIGNING BUSHING

for Small Turret Lathes and Single Spindle Automatics

Cures Mis-alignment Simply...but Accurately

That old bugaboo — machine mis-alignment — is a thing of the past. For now you can compensate for this "trouble maker" with the new J & L Aligning Bushing.

There's no guesswork involved — no approximations — no overhang. And it's *simple* to use.

The complete unit, consisting of a pair of eccentric bushings, both graduated in thousandths, can be set and put into use in a matter of minutes.

What's more, the unit sets flush with the face of the turret. It *adds no length* to your tools.

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Class III Guaranteed Not Sometimes, but Everytime!

JONES & LAMSON MACHINE COMPANY, 519 Clinton St., Springfield, Vt., U.S.A. J&L THREAD TOOL DIV.

CIRCLE INFORM-A-GRAM KEY NO. 124

Solderless Terminals and Connectors for crimping to wire extremities are illustrated and described in an eight-page bulletin. Also furnished

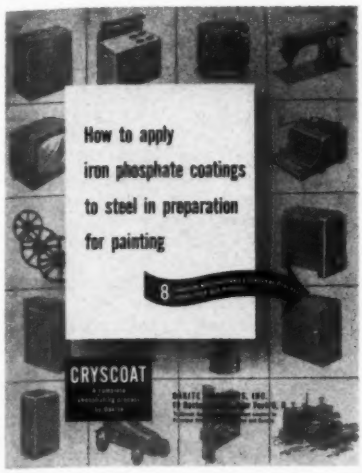
are sizes and specification data. For your copy of the bulletin, "Solderless Wiring Devices," contact Electric Terminals Corp., 2021 Center St., Cleveland 13, or —
Circle Inform-A-Gram No. B15.

A Complete Socket Screw Line is described in a new folder made available by The Cleveland Cap Screw Co., Box 600, 2917 E. 79th St., Cleveland 4. Included are socket head and flat head socket head cap screws, socket sets, button head socket screws, shoulder screws and precision ground dowel pins. Also covered are N.P.T.F. (Dryseal) pressure plugs and hex socket screw keys.
Circle Inform-A-Gram No. B16.

Model TF Milling Machine Series is covered in Catalog TF-50 released by Kearney & Trecker Corp., Milwaukee 14. The various features of these machines are illustrated and described. These machines are available in three styles — plain, universal and vertical. Included in the catalog are general specifications, plan dimensions and photos of the machines. Obtain copies from the company, or —
Circle Inform-A-Gram No. B17.

Accurately Measure the Carriage Travel of a Lathe with a single setup using the Vernier Travel Gage. It eliminates backing the carriage out of the way of work in order to measure the cut on inside or outside steps. Hole depth can be measured to 0.001". Lloyd Tool Corp., 1620 N. Broadway, Burbank, Calif., will provide a circular with further details on the Vernier Travel Gage, or —
Circle Inform-A-Gram No. B18.

How to Apply Iron Phosphate Coatings to Steel in preparation for painting is explained and diagrammed in a booklet available from Oakite Products, Inc., 157 Rector St., New York 6. Discussed are the iron



phosphate coatings used in the Crys-Coat Process. The booklet points out that the selection of iron or zinc phosphate treatments depends upon the purpose for which the article is intended.
Circle Inform-A-Gram No. B19.

"Precision Radial Roller Bearings" contains design and application data. Presented is comprehensive information on bearing selection; dimensions and load ratings; application data, with diagrams of typical applications and an appendix with several tables. For copies of Catalog PR-456-DC, write to Rollway Bearing Co., Inc., 541 Seymour St., Syracuse, N. Y., or —
Circle Inform-A-Gram No. B20.

Increase Machine Efficiency and Cut Maintenance Costs with Empco machine leveling jacks. They will also reduce machine vibration and permit quick, easy machine setups. A bulletin pictures and describes the styles available complete with specifications and prices. Enterprise Machine Parts Corp., 2731 Jerome at McNichols Rd., Detroit 12, will issue copies of the bulletin with full details, or —
Circle Inform-A-Gram No. B21.

Edge, Flat or Solder Sanding are performed by the 3M Type C Disc, which eliminates problems of disc cupping and breaking. It is shape-controlled and job-rated. A bulletin picturing typical applications and listing the specifications is supplied by Minnesota Mining & Mfg. Co., 900 Fauquier Ave., St. Paul 6, Minn., or—**Circle Inform-A-Gram No. B22.**

A 200% Increase in the Production of Automotive Body Parts and molding is possible with AHS radial draw formers. Parts seven and eight ft long in irregular channel section, irregular curving shapes with offsets, joggles and changes in cross sections can be stretch formed and planished in one piece. The rapid production features of these machines are described in Bulletin AHS-956 made available by The Cyril Bath Co., 32380 Aurora Rd., Solon, O., or —
Circle Inform-A-Gram No. B23.

The Winslow Guillotine Gage assures precision contour control for the jet engine industry. It is assembled from stock components. A bulletin lists the features of the gage and presents a drawing showing the construction of the template support tower. The bulletin also notes other standard and special gages produced by the company. Winslow Mfg. Co., 1751 E. 23rd St., Cleveland 14, will make available copies of the bulletin, or —
Circle Inform-A-Gram No. B24.

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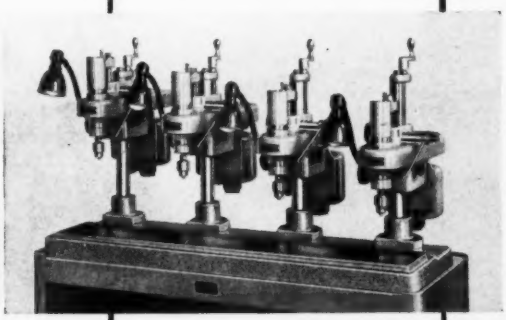
SUPER SENSITIVE, SMALL-HOLE
PRECISION
REPEAT
PRECISION
DRILLING MACHINES



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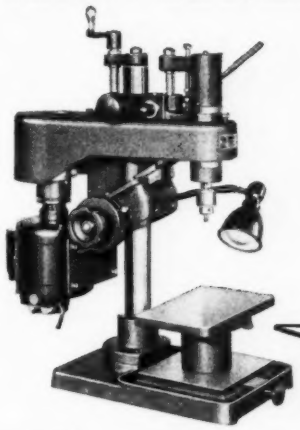

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IT'S A Hamilton Tool
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2467

CIRCLE INFORM-A-GRAM KEY NO. 125

"Ucon Hydrolubes Spell Safety" discusses the advantages and limitations of water-base, fire-resistant hydraulic fluids and gives physical properties. It contains complete information on their installation, use and maintenance. These hydrolubes are used in industrial applications where petroleum oils would present a fire hazard. Carbide and Carbon Chemicals Co., 30 E. 42nd St., New York 17, will issue copies of Booklet F-40134, or —
Circle Inform-A-Gram No. B25.

Floating Tap-and-Reamer Holders have been designed with fast-change collets which are provided with a set screw in the end for use in presetting. Changing these low cost collets with tools installed eliminates pre-setting entire holders and reduces the number of holders neeessary. A specification sheet including complete dimensions and listing the different shank types available can be obtained by writing to Seibert & Sons, Inc., Chenoa, Ill., or —
Circle Inform-A-Gram No. B26.

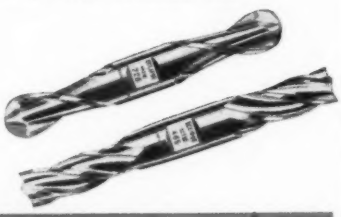
FINE CUTTING TOOLS by Eclipse

Since 1913 Eclipse has been consistently and conscientiously serving many companies in widely diversified fields of production. Each of these companies has found that "Engineered by Eclipse" is assurance of genuine quality in end cutting tools.

- High Speed Steel Cutters
- Carbide Tipped Cutters
- Core Drills
- Inserted Blade Cutters
- Multi-Diameters
- Back Spotfacers

and remember . . .

Eclipse now has a complete line of Precision End Mills. Ground from the solid, Eclipse End Mills insure longer tool life, finer finishes and lower production costs.



- Write for Counterbore Cat. No. 51
- Write for End Mill Cat. No. 56

ECLIPSE COUNTERBORE COMPANY
DETROIT 20, MICHIGAN
END MILL DIVISION—NORTH BRANCH, N. J. (ADDRESS BOX 97, RARITAN N. J.)

CIRCLE INFORM-A-GRAM KEY NO. 126

Reduce Down Time of duplicators, milling machines, pantographs and die sinkers with Black Strand cutters and blanks. A data sheet notes the features and presents a price list. Information is also contained on how to grind the cutters. For copies of the data sheet, contact Edward D. Strand Co., Box 54 West Side Sta., Worcester 2, Mass., or —
Circle Inform-A-Gram No. B27.

Deep-Drawn and Fabricated Cases of Aluminum, Brass and Steel are described in a 60-page catalog now available from Zero Mfg. Co., 1121 Chestnut St., Burbank, Calif. Over 1400 deep-drawn cases are listed as available from stock. Drawings and specifications are provided for all types. Direct requests for copies of the catalog to the company, or —
Circle Inform-A-Gram No. B28.

Precise Speed Regulation is possible when using the VS-100 drive. This electronic, variable-speed drive is adaptable to an unusually broad range of industrial applications in the ½ to 4 hp range. It is a completely "packaged" drive with all components other than the motor and operator's station contained in the control unit cabinet. Write to Reliance Electric and Engineering Co., 1088 Ivanhoe Rd., Cleveland 10, for a copy of Bulletin D-2501 containing details, or —
Circle Inform-A-Gram No. B29.

Production Speeds of 100 to 150 Blanks/Min are possible with the toggle headers covered in a new bulletin. Text, photos, reference tables and drawings are used to describe the machines used for upsetting heads on screw and rivet blanks. Complete specification tables are provided as well as a table of standard tool dimensions for three machine sizes. For copies of Circular 854-A-4, write to The Waterbury Farrel Foundry & Machine Co., Waterbury, Conn., or —
Circle Inform-A-Gram No. B30.

"X-Ray for Industry" contains operating and application data on six different types of radiography units. Information is given also on industrial image intensifier and closed-circuit television installations. The booklet shows photos and characteristics of all instruments listed and explains how they are used. In addition, three charts are given. Get your copy of the 12-page booklet from North American Philips Co., Inc., Instruments Div'n, 750 S. Fulton Ave., Mt. Vernon, N. Y., or —
Circle Inform-A-Gram No. B31.

Model 65-5 Air Power Notching and Punching Machine is introduced in illustrated Bulletin 79-D published by Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 4. Complete information and specifications are included for this machine as well as for Model 5-24 hand lever punch and shear. Illustrated also is the large selection of punches and dies which are interchangeable between these two models.

Circle Inform-A-Gram No. B32.

28 Models of a 20" Drill Press Line are described complete with specifications, in a four-page bulletin. Included are the heavy-duty construction, large capacity and special features that make the low cost 20" drill press ideal for mass-production work. A table lists speeds, feeds and capacities. Also detailed are how components and accessories can be combined to make special purpose machines or special setups. Delta Power Tool Div'n, Rockwell Mfg. Co., 465 Lexington Ave., Pittsburgh 8, will supply copies of Bulletin AD-1011, or —

Circle Inform-A-Gram No. B33.

Permanent, Distortion-Free Production Marking is possible with Airgrit jet-blast marking units. These units can be used for marking polished metal and precision finishes. A bulletin illustrates and describes each of the models available. Copies of a bulletin with details are provided by Jas. H. Matthews & Co., 3942 Forbes St., Pittsburgh 13, or —

Circle Inform-A-Gram No. B34.

A New Transparent Heavy-Duty Cutting Oil has been announced by Sun Oil Co., 1608 Walnut St., Philadelphia 3. Sunicut 85 is recommended for production threading of high-alloy steel tubing. For a copy of Technical Bulletin 48 describing the cutting oil, write to the company, or—**Circle Inform-A-Gram No. B35.**

High Speed Wicking and Oiling in a Single Automatic Operation in such products as electric motors, generators, pumps, etc. are possible with Permawick liquid lubricant. It is a combination of oil and cellulose base fibers that will not separate under injection pressure. Complete information on Permawick and its applications is found in a brochure from Fluidwick Co., 5319 E. Outer Dr., Detroit 34, or —

Circle Inform-A-Gram No. B36.

Metal Drawing and Forming, and plastic and ceramic molding are performed by platen presses. This line of fast acting, four post platen presses is available in tonnages ranging from 50 to 400 tons. Platen sizes, either square or rectangular, range from 18" x 18" to 48" x 72". Rodgers Hydraulic, Inc., St. Louis Park, Minneapolis 26, will provide copies of Bulletin 330 detailing the platen presses, or —

Circle Inform-A-Gram No. B37.

NOW CUT COST OF PRECISION GEAR PRODUCTION

THIS FEATURE: "Independent selection of speed, feed and indexing," sets the Hamilton Precision Small Gear Hobber apart from the field,

AND ENABLES the users of this machine to vary speed and feed to suit the material being machined.

THIS FACT, and a "reserve of accuracy" built into the machine, work spindle and hob spindle runout of less than .0002" as an example,

CONTRIBUTES to more gear precision with no sacrifice of gear production,

OR INCREASED gear production with no sacrifice of gear precision, ... OR BOTH!

Prices and specifications without obligation

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IT'S A Hamilton Tool
USE IT WITH CONFIDENCE

CIRCLE INFORM-A-GRAM KEY NO. 127

High Production with Dimensional Accuracy is assured with Detroit vertical single ram broaching machines. Standard capacities range from 5 to 25 tons, with higher capacities available on request. Standard cutting speeds range from 4 to 35 fpm. Each of the machine's outstanding features is illustrated and detailed. Detroit Broach & Machine Co., Rochester, Mich., will provide a bulletin with details, or —
Circle Inform-A-Gram No. B38.

Designed for Greater Speed and Power is Model C-20 drilling machine. It is sensitive enough to handle smaller size drills with hand feed, and yet has ample power to drill 1½" in mild steel, or the equivalent in other metals. Sibley Machine & Foundry Corp., 206 E. Tutt St., South Bend 23, Ind., will provide copies of Catalog 67 detailing the machine, its features and specifications, or —
Circle Inform-A-Gram No. B39.

Scully-Jones

PREMIUM ACCURACY CHUCKING TOOLS

pay for themselves fast

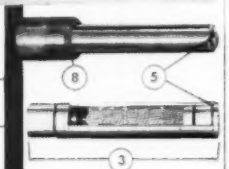
Unique operating principle brings you extreme accuracy along with tremendous holding power for internal or external chucking of parts and tools

NEW "BETTER-HOLD" CHUCKS

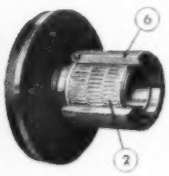
Powerful and accurate centering hold easily applied to a shank-type cutting tool by the "lock-and-eject" collet.

These benefits	...for these reasons	...result from these PREMIUM features
INCREASED ACCURACY	Run-out is often less than .0001 in.	1. Equal force is evenly applied all around the chucking surface, eliminating all play and accurately centering the part or tool.
		2. Rollers are selected to tolerances of ± .00004 in.
		3. Parts are made of tool steel carefully heat-treated and precision-ground to a high surface finish.
INCREASED PRODUCTION	Reduce loading and unloading time	4. Very little turning force required to produce tremendous holding pressures. Only rolling friction to overcome.
		5. Accurate centering hold or shrink fit easily applied by twisting the actuating cone. Powerful wedging action expands chucking surface . . . no arbor presses or hammering required. Hold or fit is easily disengaged.
	Speed tool changes	6. Powerful, accurate centering fit easily applied to shank-type cutting tool by twisting the actuating ring.
	Speed operations	7. Extreme rigidity and tremendous holding power permit use of heavier feeds at higher speeds.
		8. Pieceparts are always easy to load in the same position due to the simple and accurate method of locating and chucking.

"ROLL-LOCK" TOOLS

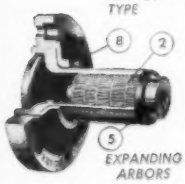


EXPANDING MANDRELS



FLANGE-TYPE CHUCKS

FLANGE-TYPE



EXPANDING ARBORS

SCULLY JONES

Call your Scully-Jones factory-trained representative or distributor for complete information and prices.

PRECISION HOLDING TOOLS

"Precision Holding" for holding precision

Scully-Jones and Company, 1913 South Rockwell St., Chicago 8, Ill.

CIRCLE INFORM-A-GRAM KEY NO. 128

"Engineered Hydraulic Equipment" presents engineering information on hydraulic reservoirs and hydraulic pumping unit accessories. Included is data on oil level sight gages, breather caps, filter breather assemblies and clarifier units. Also given are dimensional data sheets. Century Hydraulics, Inc., 7703 Lyndon Ave., Detroit 38, will make available copies of the catalog, or —
Circle Inform-A-Gram No. B40.

Industrial Rubber Products are featured in Catalog 52 put out by Atlantic India Rubber Works, Inc., 571 W. Polk St., Chicago 7. Among the items produced by the company are special compounds, special molds and dies, and hundreds of stock-mold patterns and dies. For a complete list of the products available, request a copy of the illustrated catalog from the company, or —
Circle Inform-A-Gram No. B41.

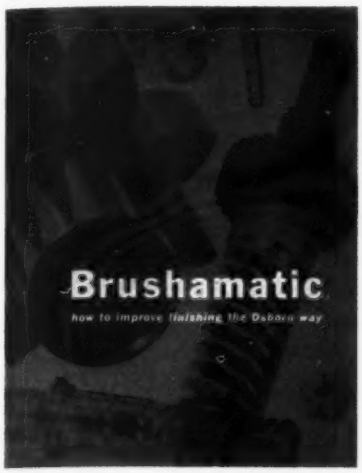
Indexing Turntables and Variable Speed Controls are detailed in Catalog 88-57 announced by Eisler Engineering Co., Inc., 750 S. 13th St., Newark 3, N. J. The company is also equipped to manufacture special mechanical arrangements to specifications, including drives of all kinds, cams, geneva gears, speed reducers and special machines.
Circle Inform-A-Gram No. B42.

An S.A.E. Boss Fittings Catalog has been published by Anchor Coupling Co., Inc., 325 N. 4th St., Libertyville, Ill. Included are assembly instructions, dimensional diagrams, and specifications. Covered are "O" ring adapters, tube nuts and straight thread "O" ring boss adapters. Obtain copies of the catalog from the company, or —
Circle Inform-A-Gram No. B43.

New and Improved Time-Saving Tools and Methods for the machine and tool industry are found in a catalog from Montgomery & Co., Inc., 1 Tichenor Lane, Newark 5, N. J. Included are tool and die makers parallels, vises, V-blocks, radius forming tools and expanding mandrels. For your copy of the catalog, contact the company, or —
Circle Inform-A-Gram No. B44.

Synchronize Variable Speed Multiple Drives with the Varidyne multiple drive system. It eliminates the need for control loops and balancing networks. A bulletin presents examples of basic Varidyne applications and shows typical installations. U. S. Electrical Motors, Inc., Milford, Conn., will send out copies of Bulletin F-1910, or —
Circle Inform-A-Gram No. B45.

Higher Quality Finishes at high rates of production are assured with Brushamatic finishing. The applications of Brushamatic machines range from the finishing of extremely rough, heavy work to precise fin-



ishing of aircraft components. The machines available and their advantages are covered in a booklet now available from The Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, or—**Circle Inform-A-Gram No. B46.**

Maximum Threading Accuracy is provided by Landis hardened and ground threading heads. These threading heads will also perform hollow milling or high speed turning operations. Design features, specifications and dimensions are given for Lanco, Landex and Landmatic threading heads. For copies of illustrated Bulletin F-80-6, write to Landis Machine Co., Waynesboro, Pa., or —
Circle Inform-A-Gram No. B47.

Arrangements of Tank and Bin Weighing Systems are found in an illustrated 12-page bulletin. Described is the recently-developed weighing system package. The "rolling ball" construction of the Emery Cell is also detailed. In addition, the proper method of applying Emery load cells to various types of tasks is shown. The A. H. Emery Co., New Canaan, Conn., will make available copies of Bulletin 561, or —
Circle Inform-A-Gram No. B48.

The Selection of Test Gages is dealt with in Catalog 400 published by United States Gauge, Div'n of American Machine and Metals, Inc., Sellersville, Pa. In addition, the catalog covers a variety of test gages for various applications in fluid pressure measurement. The catalog also provides a list of check points for ordering pressure gages.
Circle Inform-A-Gram No. B49.

Any "Small Work" Job of Grinding and Finishing is performed by Foredom flexible shaft machines. The machines and their accessories are illustrated and described in an eight-page catalog. These machines are particularly adaptable for use on small irregularly-shaped parts which cannot be handled by conventional machine setups. Foredom Electric Co., 27 Park Pl., New York 7, will supply copies of Catalog 200, or —
Circle Inform-A-Gram No. B50.

For Continuous or Intermittent-Duty Applications use Keller Tool variable speed air motors. These small-sized motors are capable of developing 1 hp. The 71J-40 Series is easily adapted to many setups with a simple plate-mounting. Full details, including applications and specifications, are found in Bulletin 71 released by Gardner-Denver Co., Keller Tool Div'n, Grand Haven, Mich., or —
Circle Inform-A-Gram No. B51.

BOKUM OFFERS SERVICE AFTER SALE OF BORING TOOLS

Factory-sharpened Bokum boring tools every time you resharpen . . . that's what you get with your Bokum boring tools. You can maintain that extra precision over the lifetime of the tool with Bokum's new, low-cost Resharpening Fixtures . . . AB-1 for tool sizes No. 00000 to No. 3, AB-4-12 for sizes No. 4 to No. 12. They're easy to use, too. Compound angles required for correct resharpening are built into the Fixtures. A diamond dresser assures exact grinding wheel setting and a carbide-tipped stop locates the tool in proper position for grinding. Keep your tools factory fresh indefinitely.

Write Dept. E for Catalog Sheets AB-1 and AB-4-12 TODAY.

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BOKUM TOOL CO. INC. 14775 Wildemere Ave. Detroit 38, Mich.

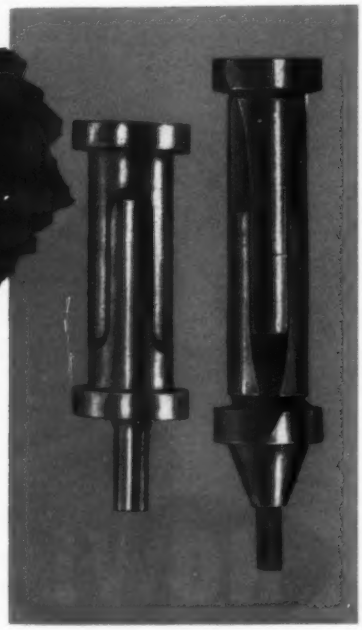
CIRCLE INFORM-A-GRAM KEY NO. 129

Both Package and Quantity Prices of Unbrako products are covered in a new net price list. Included are socket head set and cap screws, stripper bolts, socket screw keys, dowel pins and pressure plugs. All information on a product line is complete on one page or on a spread. Copies of the Unbrako consumer net price list are put out by Standard Pressed Steel Co., Box 600, Jenkintown, Pa., or —
Circle Inform-A-Gram No. B52.

Maximum Efficiency and Increased Production are possible with Stacor-Matic toe-touch drafting tables. They give each draftsman a complete work station at his fingertips in less space. One unit serves two men — a drafting surface for one and a reference desk and files for the other. Complete information is found in a catalog published by Stacor Equipment Co., 768-778 E. New York Ave., Brooklyn 3, N. Y., or —
Circle Inform-A-Gram No. B53.

A 4,000-Lb Load Capacity is a feature of a low lift elevating platform electric-driven industrial truck. Model LO-2 features balanced shockless steering and automatically controlled and timed sequence of movement through all four horizontal speeds. For details and specifications, see Bulletin 6016A provided by Automatic Transportation Co., 149 W. 87th St., Chicago 20, or —
Circle Inform-A-Gram No. B54.

The Ability to Serve Many Needs...



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Durable Perforators, Vertically Lapped, and Electrocoted, strip easier, eliminate galling and REDUCE PRESS DOWNTIME.

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Two decades of punching know-how assures you practical answers to your perforating problems. Ask for our new Durable Catalogue, and Engineers Handbook. It's FREE.

Patented and made exclusively by
DURABLE PUNCH & DIE COMPANY
1214 W. Madison Street, Chicago 7, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 130

A Complete Line of Turret Tools for Levin lathes is described in Bulletin R released by Louis Levin & Son, Inc., 3610 S. Broadway, Los Angeles 7. Included are releasing tap and die holders, and ball bearing center for use in the lathe tail stock. For additional information, get a copy of the bulletin from the company, or —
Circle Inform-A-Gram No. B55.

Reduce Time Required for Hole Layout with the Drill Press Positioner. The machine can spot a hole to a tolerance of 0.001". In addition, it reduces the number or completely eliminates the necessity for drill jigs in certain types of production work. For further details, obtain a bulletin from Bayer Industries, 240 W. Missouri Ave., Phoenix, Ariz., or —
Circle Inform-A-Gram No. B56.

Evaluate Photometric Data from spectrographic films and plates with the new Seidel calculating board. It simplifies plotting of individual emulsion calibration curves. The unit features a separate sliding scale which permits background corrections to be made directly. For complete details, obtain Bulletin SCB 10-56 from Jarrell-Ash Co., 26 Farwell St., Newtonville 60, Mass., or —
Circle Inform-A-Gram No. B57.

For Use in Structural Steel Fabrication is a wall radial drill. It will drill plates, angles and beam flanges too heavy to punch. The drill has a capacity of up to 2" dia drills in mild steel. For further details and specifications, get a copy of Bulletin 320 from Thomas Machine Mfg. Co., P.O. Box 9506, Pittsburgh 23, or —
Circle Inform-A-Gram No. B58.

Accurate to within 0.0001" is a portable length and width comparator. It checks overall length of parts, measures from one end to shoulder and measures from end of part, or shoulder, to one or more grooves. Further information is found in a circular which is made available by Jerpbak-Bayless Co., Solon Rd., Solon, O., or —
Circle Inform-A-Gram No. B59.

A Complete Listing of Tools is contained in a new folder on Super Cobalt Drills produced by Chicago-Latrobe, 411 W. Ontario St., Chicago 10. Sizes are in fractions, wire gauge

and letter size drills including those with straight and taper shanks. Technical data is supplied and a listing of cobalt bonding bits with sizes and dimensions.
Circle Inform-A-Gram No. B60.

Speed Up Feeding of Sheet Steel by separating one sheet from another with Basco sheet steel separators. These permanent magnet units induce a magnetic field in stacked steel sheets and laminations. They are made in 23 models, 4 series, suitable for handling thin tin-can sheets, up to ¼" plate in stocks 1" to 40" wide, 36" high. Catalog B1056 containing descriptions, instructions, specifications and performance charts is supplied by E. V. Nielsen, Inc., 129 Broad St., Stamford, Conn., or —
Circle Inform-A-Gram No. B61.

Bolster Plates, Finished Plate and Bolster Accessories are detailed in a catalog from Danly Machine Specialties, Inc., 2100 S. Laramie Ave., Chicago 50. Each item is illustrated and described with complete ordering information. Included are data sheets listing pressroom standards and specifications. Also shown are typical installations of die set clamps.
Circle Inform-A-Gram No. B62.

A Wide Variety of Legends can be stamped on flat, round or curved surfaces with the No. 710 hydraulic marking machine. The machine is described in a folder illustrated with diagrams and case histories. Complete specifications are also given in the folder which can be obtained from Parker Stamp Works, Franklin Ave., Hartford, Conn., or —
Circle Inform-A-Gram No. B63.

Long-Run Welding Production on regular or irregular contours is handled by Model C Heliweld automatic head. It is ideal for operations where good weld appearance is necessary or where welding specifications are very high. For a description, applications, operating advantages and specifications, get a catalog sheet from Air Reduction Sales Co., Div'n of Air Reduction Co., Inc., 150 E. 42nd St., New York 17, or —
Circle Inform-A-Gram No. B64.

Brazing Alloys for High-Temperature Applications are covered in Bulletin 22 released by Handy & Harman, 82 Fulton St., New York 38. Given are specifications, selection factors and recommended applications on four Handy Hi-Temp alloys. Also described is a six-step procedure for obtaining high quality joints with these brazing alloys. Get your copy of the bulletin from the company, or —

Circle Inform-A-Gram No. B65.

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All Types and Makes of High Speed Internal and External Grinder Spindles or Quills and Hi-cycle Units . . . Anti-Friction Live Centers
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CIRCLE INFORM-A-GRAM KEY NO. 131

Grinding Wheel Specifications and Marking Data are included in Bulletin GD-56 prepared by Electro Refractories & Abrasives Corp., 344 Delaware Ave., Buffalo 2, N. Y. The illustrated bulletin deals with resin wheels which are recommended for higher operating speeds than vitrified wheels. The resin wheels are associated with snagging operations in steel mills, foundries and metal fabricating plants where heavy, rapid metal removal is the prime consideration.
Circle Inform-A-Gram No. B66.

The Latest Developments in the use of Jergens live bearing bushings in competitive tooling and preventive maintenance are found in a new catalog. Emphasized are the increased applications of milling machine outer support units. These bushings provide an absolute seal against coolants and dust entering the bearing cavity. Donley Products, Inc., Jergens Div'n, 11106 Avon Ave., Cleveland 5, will provide copies of the catalog with specifications, or —
Circle Inform-A-Gram No. B67.

1ST

Your First Choice
FOR ANGULAR TOOLING....ROBBINS!

"Magna-Sine" Magnetic Sine Plates for precision set-ups grinding single or compound angles.

A look at the record shows exactly why Robbins equipment for angular tooling should be your first choice! Here's the record:

1ST to originate the idea of a simple sine plate for faster angular toolroom set-ups—*1936*

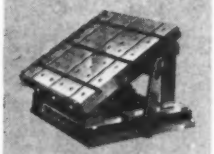
1ST to build these as a standard product for general distribution—*1936*

1ST to build a non-magnetic sine plate designed specifically for precision inspection —*1946*

1ST with a permanent magnet chuck—*1948*

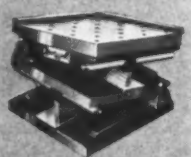
1ST heavy duty sine plate for angular machining—*1954*

1ST *and the only one with* the exclusive "PERMA-FLAT" SWIVEL BLOCK—*1956*



Heavy Duty Sine Plates for angular machining. Wide variety of sizes. 12" square model shown.

Robbins is the only sine plate manufacturer with a complete line of sine plates for every angular set-up problem in precision machining, grinding and inspection. We also offer complete engineering and manufacturing facilities for the solution of special problems, and are now building high-production automatic assembly and other special machines. Send for sine plate literature, or send us details of your requirements in special machinery.



Inspection Sine Plates for precision inspection and light machining on single or compound angles.

OMER E. Robbins COMPANY
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Also manufacturers of special machinery, automatic assembly machinery.

CIRCLE INFORM-A-GRAM KEY NO. 132

Liquid Coolant Chillers for industrial installations are illustrated and described in a bulletin published by Lundholm Mfg. Co., 1123 Charles St., Rockford 1, Ill. These fully automatic chillers which are compact, self-contained and dual controlled,

eliminate the use of large coolant reservoirs. Also shown in the bulletin are two typical applications of the chillers. Obtain your copy from the company, or —
Circle Inform-A-Gram No. B68.

Cutting Tools are featured in a catalog from Conical Tool Co., 3800 Buchanan, S.W., Grand Rapids 8, Mich. Included are heavy duty end mills, and combination fly cutters and boring tools. Presented is a table of draft angles, and information on cutter selection, use of the cutter and speed. The company will supply copies of the catalog, or —
Circle Inform-A-Gram No. B69.

The Velvetrace Milling Machine is highlighted in a circular issued by Pratt & Whitney Co., Inc., West Hartford 1, Conn. Detailed is the duplex rotary fixture for duplicating circular parts by utilizing rotary motion. Also shown is a right and left fixture, depth template attachment and adjustable model fixture. Contact the company for copies of Circular 590-A, or —
Circle Inform-A-Gram No. B70.

Designed for Producing Powdered Metal Parts of complicated cross-section is a hydraulic powdered metal press. With Haller Model 6-125, high production of parts of uniform density is achieved with relatively simple tools. Farrel-Birmingham Co., Inc., Watson-Stillman Press Div'n, 301 Aldene Rd., Roselle, N. J., will supply copies of Bulletin 380, or—**Circle Inform-A-Gram No. B71.**

Let ETTCO help you plan on production drilling and tapping of small holes ... *at a realistic investment!*

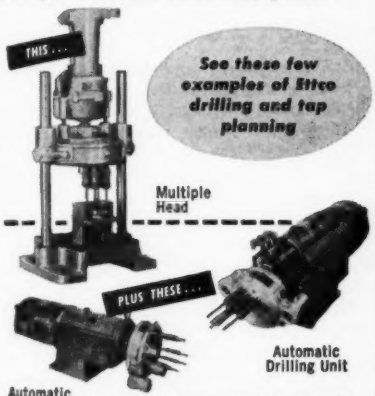
Ettco-Emrick

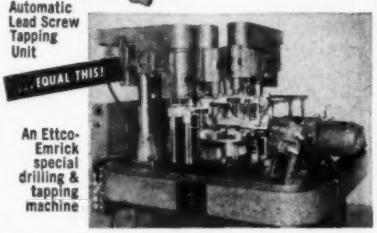
THE ONLY FULL LINE MANUFACTURER OF DRILLING AND TAPPING EQUIPMENT FOR THE ENTIRE SMALL HOLE FIELD

If you've discarded the idea of multiple drilling and tapping small holes because of heavy initial investment, that's another reason why it pays to plan with Ettco.

Ettco-Emrick equipment is built of standardized "Unit-Engineered" parts and *fewer* parts—most of which are interchangeable and reuseable elsewhere.

And since Ettco concentrates solely on the design and manufacture of small hole equipment, you can be sure the unit or machine recommended is *exactly* suited to the job; highly efficient, yet never expensively over-powered—thus realistically priced.





Typical of Ettco "Unit-Engineering": Standard multiple heads, work holding fixtures and famous "Tap & Drill Twins" can be assembled in any combination to make high production special purpose drilling and tapping machines at realistic prices. Use the Twins separately or in combination — single spindle or with multiple heads.

Let's prove it! Send us a sample part and information on your production requirements and we'll report immediately. Ask for our catalog, too. *Authorized Ettco distributors are ready to serve you throughout the U.S. and Canada.*

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TAPPING ATTACHMENTS • MULTIPLE HEADS • DRILLING & TAPPING UNITS AND MACHINES • SPECIAL MACHINES INDEXING FIXTURES • TAP & DRILL CHUCKS

CIRCLE INFORM-A-GRAM KEY NO. 1331

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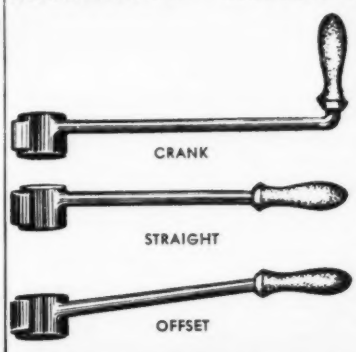
MALLEABLE MACHINE HANDLES



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Includes scores of other tool room needs such as plastic and steel ball handles, C.I. hand knobs, C.I. hand wheels, compression springs, balanced cranks, clamping levers, etc.

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CIRCLE INFORM-A-GRAM KEY NO. 1332

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- ☐ 70-1 CHUCKS
- ☐ ABC BOOKLET
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TO:

NAME _____ TITLE _____

COMPANY _____

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CIRCLE INFORM-A-GRAM KEY NO. 1333

MEN YOU SHOULD KNOW

John M. Dolan has been named vice president-general manager of the Field Sales Division of Giddings & Lewis Machine Tool Co.

◆

John Mourer has been appointed assistant general manager of Gardner Machine Co., a subsidiary of Landis Tool Co.

◆

Lowell F. Sarnes has become director of the quality control office at Ford Motor Co. He succeeds **Roscoe Smith,** who has retired.

The appointment of **Charles W. Wesson** as general manager has been disclosed by The Eastern Machine Screw Corp. He will be responsible for all factory operations. He formerly was with Sargent & Co.

◆

R. E. Woodcock has taken over as manager of the Marion (Ind.) division of Dana Corp., succeeding **Mason Hamilton** who resigned. Mr. Woodcock's former position as manager of the Auburn (Ind.) division is being filled by **Ren C. McPherson.**

The new president of The Waterbury Farrel Foundry & Machine Co. is **A. Dale Mitchell.** He fills the post left vacant by the death of **Joseph Schaeffer** in September. **Fred S. Van Valkenburg** has been elected chairman of the board.

◆

Nacimco Products, a newly-formed San Diego company, is headed by **C. L. Rubesh** as president. He is in charge of all production. Chief engineer is **R. G. Greenbaum. W. Don Howell** is serving as general manager of the company. Nacimco produces precision parts and tooling for the aircraft industry and technical instrumentation systems, both ground and airborne, for aircraft and missiles.

◆

The election of **Joseph L. Kane** as vice president of Kennametal Inc. has been disclosed. In addition to participating actively in planning the company's current expansion program, he will be concerned with other administrational duties, and will serve as co-ordinator of the firm's activities with government defense agencies.

◆

The appointment of **Donald C. Erdman** as assistant to the president has been made known by Sperry Products, Inc. In his new position, Mr. Erdman will be active in promoting the progressive development of the ultrasonic Reflectoscope.

◆

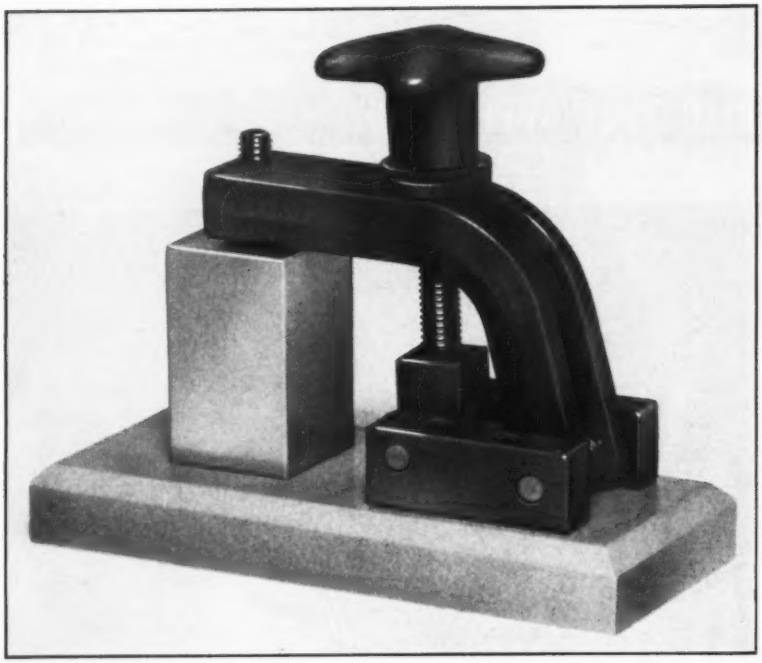
Clarence G. Bauer is the new manager of quality control for the Stamping Division of Chrysler Corp. He succeeds **John J. Pathe** who has been promoted to the general manager's staff. **Frank H. Brown** is serving as manager of production planning and material control for this division. In his new assignment, Mr. Brown is responsible for coordinating production planning and material control activities for the corporation's 16 Stamping Division plants. The company also has announced the appointment of **Harry R. Bentley** as manager of the Engine Division plant at Trenton, Mich.

◆

William E. Mahaffay has been elected vice president-engineering for Whirlpool-Seeger Corp. He will direct all activities relating to engineering, research and development.

◆

Three new vice presidents have been named by Perfection Industries Division, Hupp Corp. **Daniel N. Gredys** has been elected vice president in charge of engineering. **H. A. Consor** has become vice president of manufacturing at the company's Cleveland plant and **John Gardner,** vice president of manufacturing at Waynesboro, Ga.



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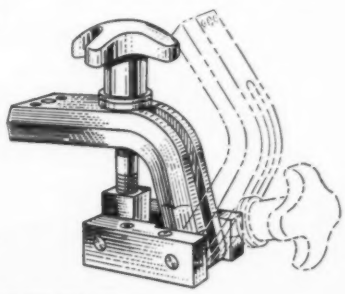
LODDING RETRACTING CLAMPS

Lodding Retracting Clamps lend themselves to infinite variation. Jaws are added to suit work. Tapped and clear holes are there for you to use. Lodding provides four types of action—and your own imagination is the limit to the variety of jaws you can add. Four sizes each of four styles—hand knob, hand cam, nut and air operated.



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Los Angeles 3, Calif.

Bagby Engineering Co.
1047 Forest Ave.
Evanston, Ill.

CIRCLE INFORM-A-GRAM KEY NO. 134

MEN YOU SHOULD KNOW

Robert C. Lindberg has taken over as production manager of Firth-Loach Metals, Inc., according to an announcement by **William J. Loach,** president. Mr. Lindberg has been in the carbide field for 21 years.

◆

The naming of **Douglas R. Starrett** as executive vice president has been announced by The L. S. Starrett Co.

◆

The Aro Equipment Corp. has promoted **K. H. Zinsmaster** to manager of procurement and production planning. He will head a newly-organized department with full responsibility for materials procurement, inventory control, production control and production planning for long and short-term periods.

◆

Robert Logie has been appointed executive vice president of Firth Sterling, Inc. In addition, he has been elected to the board of directors. Before joining the firm, Mr. Logie was associated with The National Roll & Foundry Co.

◆

The promotion of four men to vice presidencies has been disclosed by Hughes Aircraft Co. **Edward M. Boykin** has become vice president-field operations and **C. Harper Brubaker,** vice president-planning and programming. The new vice president-flight operation is **Clarence A. Shoop. Roy E. Wendahl** has taken over as vice president and manager of Tucson, Ariz., operations.

◆

Richard Owen has succeeded **William B. Grant** who has resigned, as general manager of Martin Grinding and Machine Works, Inc.

◆

Filling the newly-created position of manager of the Milwaukee plants of AC Spark Plug Division of General Motors Corp. is **Warren E. Milner.** He is heading all AC-Milwaukee operations, including defense engineering, production and sales, and defense engineering activities in Flint.

◆

William W. Leitch has moved into the position of general manager of the Vibration Division of MB Mfg. Co., a division of Textron, Inc.

◆

To expand new product service facilities, Mac Dermid, Inc., has disclosed the appointment of **J. Douglas Patrick** to the post of product development engineer. Under his direction, the company's product development will be field tested under production conditions in customers' plants. Mr. Patrick will concentrate on the New England area.

◆

Director of research and engineering at The Indiana Steel Products Co. is **James R. Ireland.**

Edward H. Jacobs has become works manager of Abrasive Machine Tool Co. His chief concern will be supervision of production of the company's line of precision surface grinders.

◆

Edward McClaud has been appointed chief engineer by Parker Stamp Works. He will be in charge of product process and tool engineering.

The Transformer Division of Westinghouse Electric Corp. has formed a new power transformer department with **R. N. McCollom** as department manager. In this position, Mr. McCollom is responsible for all phases of the power transformer business, including sales, engineering, order service and manufacturing. **H. B. West** has been promoted to the post of assistant manager of the Transformer Division, directing manufacturing services.

Talk to the people at

3P

It's a fast service company, staffed with personnel who know that "DOWN-TIME" is "LOST-TIME". Distributors in principle cities assure IMMEDIATE DELIVERY from over 37,000 sizes in stock.

You get the finest quality in 3P HEAD PUNCHES and DIE BUTTONS, because they are made from 3 types of the finest tool steel, and are available in any DECIMAL size.

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GET 3P PUNCHES AND DIE BUTTONS WHEN YOU NEED THEM.

Porter Precision Products also make BAL-LOK* Punches and Die Buttons. They're always in stock and ready for IMMEDIATE DELIVERY too. Any DECIMAL size.

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CIRCLE INFORM-A-GRAM KEY NO. 135

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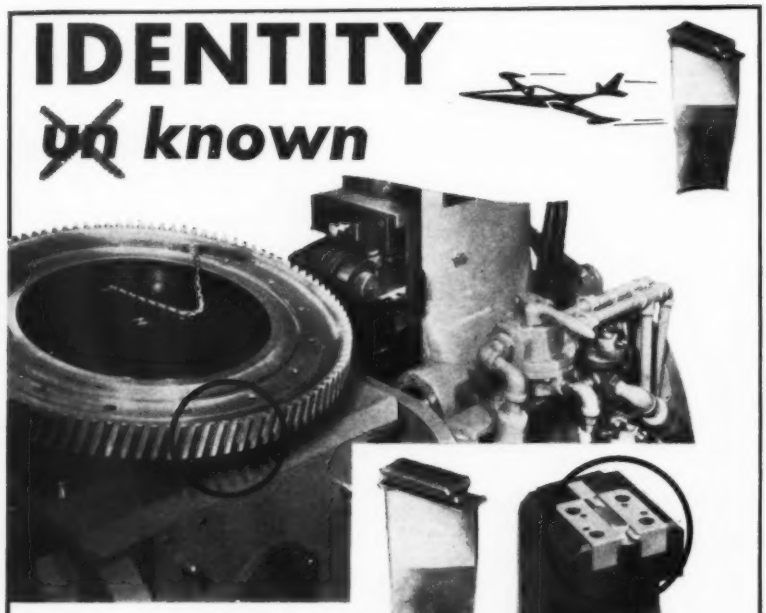

These two precision component parts require equally precision, perfectly legible marking on specially designed Matthews Machines for positive identification and assembly. Regardless of your product, let Matthews provide engineered, custom-built Marking Tools for every production rate.

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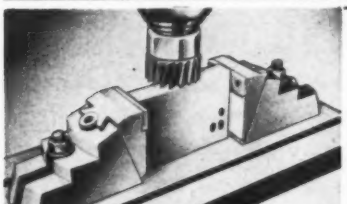
CIRCLE INFORM-A-GRAM KEY NO. 1361



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System Hubner

WHY use them?

1. Clamping action **Vertical** as well as **Horizontal**—pressing workpiece down directly on the machine table. No hammering. No air between.
2. Gain more working room.
3. Faster and more secure setups. Easier to handle.
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5. No straps overlapping on the workpiece; more machining surface.
6. Extremely versatile—take light cuts or heavy cuts, use on small machines or heaviest production machines.

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SPEED SURFACE GRINDING SET-UPS WITH

MAGNE-BLOX
LAMINATED PARALLELS AND V-BLOCKS
Save Your Magnetic Chucks
Eliminate Clamps
Eliminate Holding Devices

- Grind Work Square
- Grind Work Parallel
- Hold Round Pieces

UNIVERSAL SET IN CASE $26.25

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CIRCLE INFORM-A-GRAM KEY NO. 1363

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DRESEL-BETZ CO.
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Designers and Manufacturers of Tools, Dies, Jigs, Fixtures, Metal Stampings,

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DESIGNERS AND BUILDERS
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KIFFER TOOL & DIE CO.
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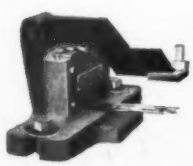

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6" wide $95.00
12" wide $195.00
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JACO DEVICES, INC.
96 High St., Hingham, Mass.

CIRCLE INFORM-A-GRAM KEY NO. 1364

J. P. Arndt, Jr. has been appointed general sales manager and assistant to the vice president of Brush Electronics Co., division of Clevite Corp. In his new post, he will concentrate on product planning and development. Mr. Arndt joined the company in 1935.

◆

The appointment of **James MacCracken Adair** as sales manager of the Dynamatic Division of Eaton Mfg. Co. in Kenosha, Wis., has been announced. He replaces **G. E. Walk,** who has resigned.

◆

Frank T. Goll has been promoted to sales manager of C. A. Norgren Co. The announcement was made by **D. G. Faust,** vice president, sales and advertising.

◆

Kearney & Trecker Corp. has disclosed two new appointments. **John Burg** has been named eastern district manager, responsible for sales activities in Buffalo, Syracuse, Rochester, New York, Boston and Philadelphia. His successor as metropolitan New York manager will be **Alfred Hostvedt.** Prior to his appointment, Mr. Hostvedt was manager of the Syracuse territory.

◆

The new assistant general sales manager of Landis Tool Co. is **J. J. Keane.** He has been with the firm since 1927.

◆

Townsend Co. has disclosed the reorganization of its Technical Sales Department under general sales manager, **George A. Bentley.** Technical sales previously were headed by **H. C. Weidner, Jr.** who is now serving as vice president of Impact Products, Inc., Orangeville, Ohio, a new Townsend affiliate. **W. L. Nicolay** has assumed Mr. Weidner's duties as manager of technical sales. The new product manager of lockbolt sales is **John J. Perz.**

◆

Frank W. Krohn has been appointed field engineer by Norton Co. and assigned to its Detroit district office. A new field engineer in the Detroit area is **William Pettigrew. Russell J. O'Neil** and **Lincoln M. Johnson** have been appointed abrasive engineers, covering accounts in metropolitan Detroit.

◆

L. L. Dodge has been named assistant general sales manager of Dana Corp., working out of the company's general offices in Toledo, Ohio.

David Meyer has accepted a position with Illinois Tool Works as sales engineer for the southern Indiana territory according to an announcement by **R. E. Wolff,** marketing manager of the company's Tool and Machine Division. In his new position, Mr. Meyer succeeds **Ray Blakeman** who has been promoted to an executive position in this division at the firm's headquarters in Chicago.

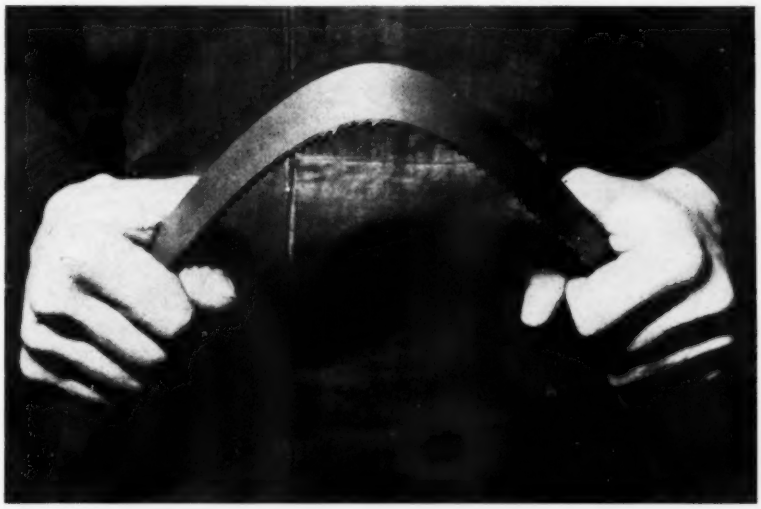
◆

Cleveland Cap Screw Co. has named **Francis P. Blonska** administrative assistant in sales. His principal duties will be the coordination of administrative activities connected with special cap screw sales.

Irvin R. Spangler has taken over as assistant sales manager for the Machine and Tools Division of Michigan Tool Co. in Detroit. **Lou D. Grove** has been appointed sales and engineering representative in New York for Cone-Drive Gears Division, with headquarters in Penfield, N. Y.

◆

The position of lathe sales engineer for the Machine Tool Department of Axelson Division of U. S. Industries, Inc. has been filled by **Kenneth C. Bradley.** He has been assigned to the Southern California territory working out of the division's main offices in Vernon, Calif.



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With a MARVEL Blade, you can cut any material—from the free machining steels to the toughest alloys . . . fast, accurately and economically. You can tension a MARVEL Blade from 200% to 300% tauter than any ordinary blade, permitting much higher speeds and heavier feeds without deflection or breakage.

Like all good things, attempted copies of the MARVEL Blade have been numerous, but its performance has been *unequalled* by any of the imitators. Ask for MARVEL Blades by name and you can be sure you're getting the best on the market. Leading Industrial Distributors have them in stock.

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CIRCLE INFORM-A-GRAM KEY NO. 1381

NEW

SUPER 80

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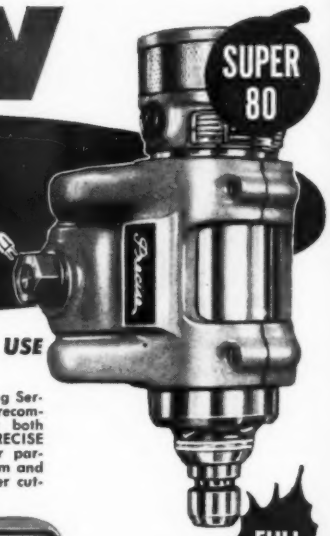

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Largest and Most Powerful Available.

Super Accurate Collet Chuck with ½" Capacity to Insure Maximum Rigidity for modern precision demands. (Available also with solid quill extension for mounting wheels to ½" I.D. and 2½" O.D.)

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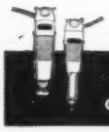

Precise

PRECISE PRODUCTS CORP.
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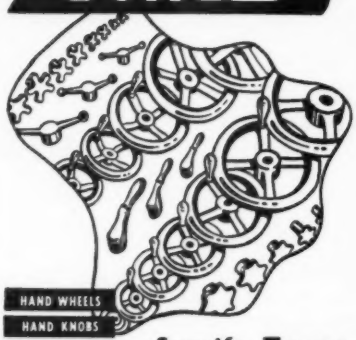
QUALITY AND PRECISION SINCE 1882

CIRCLE INFORM-A-GRAM KEY NO. 1382

Tomco



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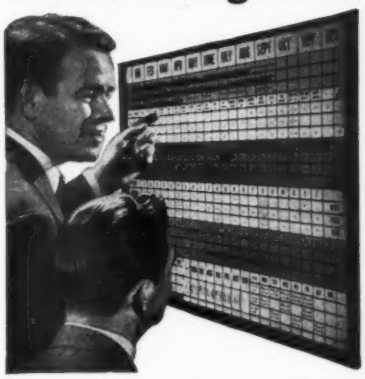

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CIRCLE INFORM-A-GRAM KEY NO. 1384

GROWING PAINS

A $2,500,000 expansion program has been disclosed by **The Aro Equipment Corporation.** The factory and offices will be enlarged by 60,000 sq ft of floor space during the next five years. The first step in this program will be the completion of 9,600 sq ft of floor space in the company's East End plant in Bryan, Ohio. This building will have almost complete facilities for the production and assembly of liquid oxygen converters and components.

◆

A plant has been built in Elmwood, Conn., by **The H. P. Townsend Manufacturing Company** to accommodate the production of four lines of automatic machines. The company has acquired Cleveland Tapping Company, Cochrane-Bly Company and the Machine Division of Taylor & Fenn Company. These three lines of automatic machines have been consolidated with Townsend's line of automatic screw and riveting machines.

◆

A new half-million-dollar manufacturing facility will be constructed in Wabash, Ind., by **Minneapolis-Honeywell Regulator Company.** The 58,000-sq-ft building will be used for the production of electronic air cleaning equipment and other specialized metal products for commercial and residential temperature control systems.

◆

The Sterling Die Division of **Pratt & Whitney Company, Inc.,** has completed its move to a new plant location in the Southwest Industrial Park section of Cleveland, that will more than treble its manufacturing facilities. The division produces a full line of dies to roll threads on bolts and on machine screws, wood screws and sheet metal screws.

◆

Building has been begun by **The Warner & Swasey Company** for the first of two additions to its New Philadelphia, Ohio plant. This expansion program will increase machine tool production capacity by an estimated 25%. The new building with manufacturing and storage space totalling 33,000 sq ft, will be completed in April, 1957.

Hughes Aircraft Company is planning to build a $1,250,000 engineering facility. It will occupy more than 50,000 sq ft, devoted to technical laboratories and offices. The firm manufactures Falcon air-to-air guided missiles.

◆

Construction of a new $500,000 metallurgical research laboratory will begin next spring at **The Timken Roller Bearing Company** in Canton, Ohio. The structure with 11,800 sq ft of floor space will centralize many of the research facilities now located in several separate buildings.

George L. Nankervis Company has occupied the new multi-million-dollar facility which houses its own manufacturing operations and those of its recently acquired subsidiary, the Commercial Research Division. The plant is devoted to the manufacture of testing equipment.

◆

Arthur Colton Company is expanding its punch and die facilities at Mancelona, Mich. The plant produces rotary and single-punch tablet press punches and dies.

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with flutes shorter than regular

Offer GREATER STRENGTH...*

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CIRCLE INFORM-A-GRAM KEY NO. 139

HOLDING EMPLOYEE INTEREST IN THE SAFETY PROGRAM

by Ernest W. Fair

"THIS HAS BEEN ONE OF THOSE DAYS," the shop executive told his wife at the supper table. "Just a month ago we spent a lot of money and time working up a good safety program . . . held meetings . . . gave instruction . . . did everything we could to put it over . . . and do you know what? The men have as good as forgotten the whole thing today."

The program was an excellent one, carefully thought out and programmed, except for two things — no effort was made to adapt it to the specific thinking of the employees, or to make each man an important part of the program.

Many a good safety program has floundered on neglect of this last point. It should be an even more important part of planning than drawing up the general program itself, for no safety program in any machine shop can ever be any better than the employees therein make the program.

We've checked into several score such safety programs where employees wholeheartedly took part in the program and put it over. In paragraphs to follow are summarized the important ingredients of those successful programs. Each and every one can be adapted to any machine shop operation, large or small, regardless of the size of the staff.

The single most important factor we have to keep in mind is that safety education has its limits when applied to employees. Generalities do not produce results. In nearly every case they leave the employee indifferent and disinterested. The program itself must be loaded with specific HOW the individual employee can put safety to his own use at his own job. Mass safety education is satisfactory only when devoted to an effort to impress employees with the need for greater attention to safety and what it will mean to each of them individually. It has been proved practical only in selling generalities; never in specific application by each man to his own work.

Experienced safety education executives point out that the education plan must not only teach the merits of safety, but employees must be told what specific dangers in their own line of work should be guarded against and what specific things they can do themselves to avoid injury.

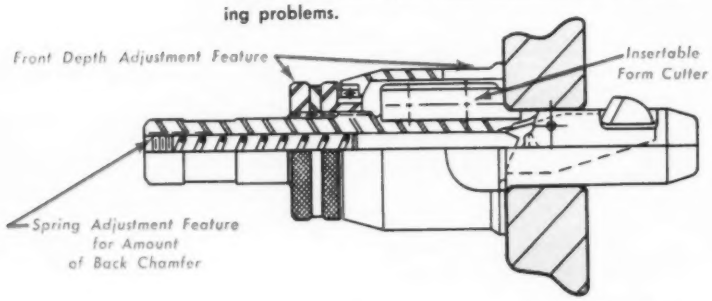
It should also be kept in mind that the process requires discipline in mind and body and that this must be one of the primary points of education. Until it has been impressed on employees, they will never give the proper attention to even the specific applications of safety at their own jobs. Many experts point out that well trained men avoid injury on dangerous work.

The educational program is always more successful when an initial effort is made to arouse the interest of foremen and department heads prior to presentation of the program to the individual employee. The foreman is always in the best position to do the actual educational job. However, it must be kept in mind that the average machine shop superintendent or foreman is usually so busy on other problems that a specific effort must be made to convince him that his own special attention to safety is required.

Experience has shown that this can be accomplished much more successfully when the superintendent, department heads and foreman are ac-

we invite trouble

Our experienced Staff of tool craftsmen and production engineers stand ready to design the special tool you need to overcome your hole deburring and chamfering problems.



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Low Cost... Compact... Powerful... Rugged

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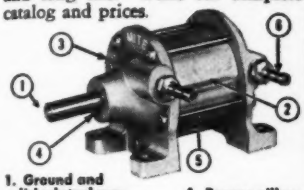

1. Ground and polished steel ram
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3. High strength aluminum alloy cylinder heads
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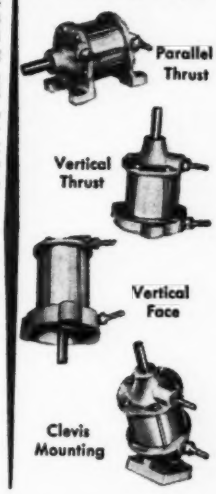
4 Mounting Types



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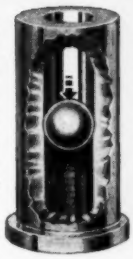
Here's *NEW Speed and Economy* in HOLE SIZING and FINISHING!

BALLIZING is a high-speed, high-precision process for sizing and finishing holes—simply by pressing a suitably-oversize ball through the unfinished hole. It is used to advantage with holes from 1/16" to 5" diameter, in a wide range of metals—with production quantities from 1 piece to millions.


Rod (not shown) pushes ball through unfinished hole.
Precision ball of tungsten carbide, slightly larger than finished hole.
Hole before ballizing.

ADVANTAGES:

- FAST. Takes only seconds. Well suited to automation.
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ANTI-FRICTION BEARINGS FOR SPECIAL REQUIREMENTS
TOOLING BALLS — MASTER BALLS — SPHERICAL FINISHING

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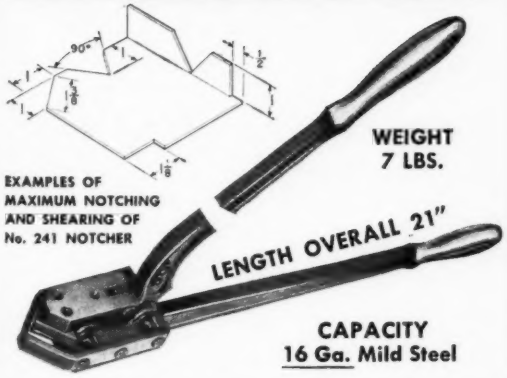
EASY-WORKING, *POWERFUL*

WHITNEY-JENSEN No. 241 HAND NOTCHER



Useful for a lot of different notching operations, as shown by examples of side, corner, and flange cuts. Very efficient on corner moulding, also shallow sheet metal channels. The curved blade hooks to a point that will engage a punch prick for exact location of notch.

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Easy, sure measurement to 0.0001" cuts rejects and speeds production

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Toolmakers' Microscope

Ultimate in measuring microscopes. Range 2" x 4", reading to 0.0001", angular measurement to 1 minute.

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High quality, low cost instrument for extremely precise measurements. Range 0.08", reading to 0.00002".

Write for Bulletin 161-54 showing applications, models, specifications.

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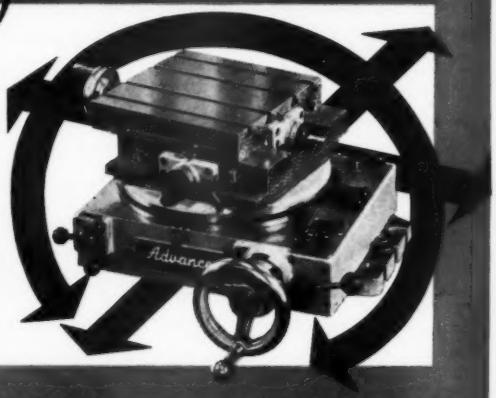

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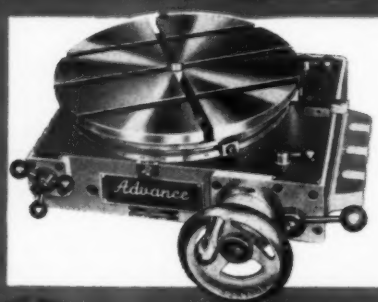

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Full details on request.

MORRISON ENGINEERING COMPANY

CIRCLE INFORM-A-GRAM KEY NO. 1423

tively consulted in formation of the safety education program as to what material it should include and how it should be carried out.

The most successful safety education programs have always tied such immediate supervisors closely to the work. Four principal parts of supervisory participation are usually included. These are: (a) asking for their assistance in determining the standards for guarding equipment, (b) requesting their specific suggestions in formulating the safety rules as they will be set up for each supervisor, (c) fixing their responsibility to investigate all accidents and decide what must be done to prevent the recurrence of each such accident, and (d) making it their responsibility to review all safety suggestions and records and decide upon their practicability.

Once this has been done there are many steps the management can take to bring the safety program closer to employees and generate their complete cooperation. In one company, for example, where a program of mass meetings had been ineffective and the safety education venture had come to a virtual standstill, it was found that emphasis placed on specific safe practice rules rekindled that interest and brought results.

Education of individual workers in this shop progressed to a satisfactory level because the new safe practice rules applied directly to the work of these men. Then a supervisors' report of accident investigation was developed and put into use. Each supervisor was required to locate the essential facts and make use of them. This step made supervisor cooperation in safety education automatic.

In another shop the conference type of safety education was decided upon as the best manner of reaching employees. In addition to the regular program, periodic meetings of foreman and key workers in each department were held. The subjects were selected in advance of each meeting and plans were made as to which employees would take an active part in the leadership of such discussions. Three general topics were selected, (a) the principles of accident prevention, (b) the major causes of departmental accidents, and (c) what corrective action was to be taken. Here again a lagging safety education program suddenly sprang to life and secured full employee cooperation. This end was obtained because the individual's part in the program was strongly encouraged. Set speeches were avoided at every such meeting, with each being conducted as a round table forum. The net result was a thoroughly workable safety program as well as one in which each employee had a particularly keen interest because he had had an important part in creating the whole safety program in the first place.

In a third organization where the original generalized safety education program was obviously getting nowhere, results were obtained by putting all emphasis on safe practice rules themselves. After a series of discussions with specific groups of employees, a new set of such rules was formulated from the suggestions and ideas the employees had offered in these meetings. These were then mimeographed and released in pamphlet form for the employees to take home and read.

Another program was made particularly successful when the safety director added an unusual feature in the form of a safety playlet he had written in cooperation with the publicity department. The whole idea created the "dumb" workman who did everything wrong and held interest by the laughs he produced. A check after its presentation showed, however, that the average employee remembered a great deal more of the specific safety ideas than he had following a series of cut-and-dried lectures which offered the very same suggestions.

. . . Continued on Next Page

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Hudson 8-1811

Dayton, Ohio
John M. Gorman Co.
Taylor 7639

Madeira, Ohio
Ray W. Pratt Co.
Main 1-8669

KENTUCKY, Louisville
Wilhelm Tool Agency
Highland 4555

MICHIGAN, Flint
Automotive Factory Supply
Cedar 2-1139

Grand Rapids, Mich
W. J. Seibel
Glendale 2-0861

Dearborn, Mich
James Perrone
Logan 59260-1

INDIANA, Indianapolis
Richard Pratt
Melrose 8-3102

ILLINOIS, Chicago
Jerico Inc.
Columbus 1-4321

WISCONSIN, Milwaukee
Robert Crane
Broadway 1-2510

MISSOURI, Kansas City
John Theurer
Fleming 3-2588

GEORGIA, Atlanta
Precision Die Supply Co.
Cypress 0809

CALIFORNIA, Los Angeles
Dillon Stevens & Co.
Richmond 7-9221

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PIVOT PUNCH and DIE CORPORATION
NORTH TONAWANDA, NEW YORK

CIRCLE INFORM-A-GRAM KEY NO. 143

This particular playlet was even more successful because the men themselves played the roles. Following presentation of the playlet another successful step was taken — selected key men were chosen to set the example. Each of these men were chosen because he was looked up to and respected by the other workers on the job with him. It was found that what he said and did on the job impressed the other workmen more forcefully because they usually looked up to and respected his good judgement.

Safety suggestion boxes have also been used in many organizations to heighten employee interest and participation in the safety education program. Monthly cash prizes for best suggestions have proven an incentive in each suggestion box program. Self-education in such cases is particularly effective because it virtually forces employees to think about safety. No better results can ever be attained than when this has been accomplished. Failure to arouse self-education in the program is usually a guarantee that the shop management is wasting a lot of money and effort.

No-accident contests work along much the same line. Contests create rivalry between various departments which also arouses the individual interest of every employee in self-education in safety.

No safety program in any machine shop can ever approach even mild success without the full cooperation of each individual employee in the safety education procedure. It should be as important a part of the planning as any other factor and should be so established from the very first moment any step is taken toward drawing up such a safety education program in the shop.

When this has been done, no executive will be complaining to his wife at the supper table about the indifference of the men to the "brain child" into which he has put so much sweat and tears. He is much more certain to be bringing her home daily fact reports on how well the men are taking to the idea and putting it over!

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why you can be sure of...

- LOW MICROINCH SURFACE FINISHES
- TOLERANCES DOWN IN THE MILLIONTHS
- INCREASED PRODUCTION
- LOWER COSTS

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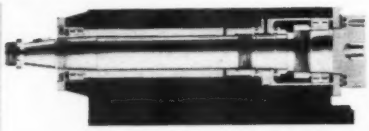
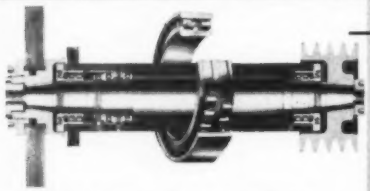
FOR SURFACE GRINDERS—

POPE 1, 2 and 3 HP, Totally Enclosed 1800 and 3600 RPM Motorized, Cartridge Type Spindles with massive shafts and big, double row cylindrical roller bearings having enormous capacity, superior performance and long life.



FOR BORING ROUND HOLES WITHIN MILLIONTHS OF AN INCH

POPE Heavy Duty Boring Spindles for smooth, chatter free, continuous high production of accurate parts. Again, look at the big cylindrical roller bearings and thrust bearings.



FOR CYLINDRICAL GRINDING—

POPE Cartridge Type and Wheel Head Belt Driven Spindles with the capacity to produce more work whether you plunge grind with a crush dressed wheel, remove surplus metal, or produce low microinch surface finishes. Note the super-precision radial bearings and ball thrust bearings.

FOR HEAVY DUTY MILLING—

POPE Spindles have the double row cylindrical roller bearings for the extra rigidity to support the cutting tool, and the double direction thrust bearings with the excess capacity to stabilize the shaft against endwise movement in either direction. This adds up to longer cutting tool life, more production, lower cost per piece.

POPE *engineers and builds standard and special, precision anti-friction bearing Spindles for every purpose. Send us your specifications for prompt quotations.*

No. 115

Specify **POPE** PRECISION SPINDLES

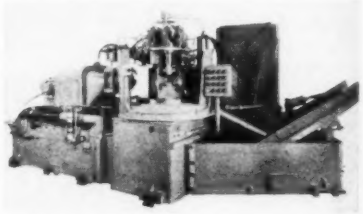
POPE MACHINERY CORPORATION
Established 1920
261 RIVER STREET • HAVERHILL, MASSACHUSETTS

CIRCLE INFORM-A-GRAM KEY NO. 144

INDEXING MACHINE CONSTRUCTED FROM STANDARD UNITS

This horizontal 2-way index machine faces and chamfers both ends of a steel elbow simultaneously, so that when the elbow leaves the machine, it is ready for welding.

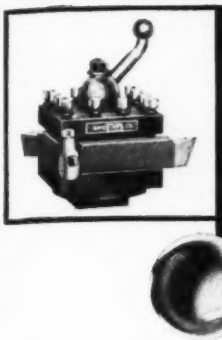
An electric-powered index table has two positions. For greater rigidity heads target into the fixture. Single-point carbide tools are mounted on sliding catheads which pilot from the inside diameter of the elbow.



Operation is automatic, with the operator simply loading and unloading one station. Production at 100% efficiency is 146/hr on 1" elbows and 27/hr on the 4" size. Speed changes for different size elbows are accomplished quickly by pick-off gears on the drive bracket. Fixture jaws are replaceable for different diameter elbows.

The machine is composed of standard components that can be adapted to other uses such as boring, drilling, and tapping. This flexibility makes Baker Basics, built by Baker Brothers, Inc., Toledo, Ohio, practicable for automation even on lower production runs.

Enco Turrets Assure ±.0005" Accuracy



by being on the ball!

Enco's passion for exacting accuracy is paying off in metal working operations everywhere! Combining precision lathe output with efficiency and economy has become a necessity . . . and Enco turrets have proved the ideal answer. An Enco turret transforms one lathe into a production machine, each operation of unsurpassed accuracy due to *spring loaded ball design!*

Spring loaded balls give you the accuracy you want! Hardened steel precision balls locked between accurately milled spherical seats consistently give accuracy in re-indexing. Hardened all steel construction minimizes wear, retains built in precision.

Write today for catalog No. 53. There's an ENCO turret for every lathe.

ENCO

Manufacturing Company, 4520 W. Fullerton Ave. Chicago 39, Ill., Dept. 717

CIRCLE INFORM-A-GRAM KEY NO.. 1451

100 USES

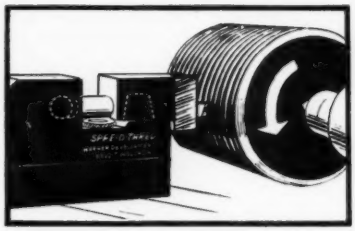
PRODUCTO SELF-CENTERING SHAFT VISE

This versatile vise has a hundred uses in your shop. Made for vertical or horizontal mounting, it's ideal for holding shafts or spindles ⅜" to 3⅛" dia. when machining keyways, slots, splines. Design insures accurate radial cuts. Write for detailed bulletin.

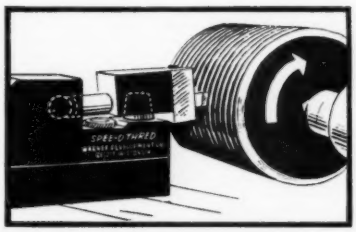
THE PRODUCTO MACHINE CO.
970 Housatonic Avenue
Bridgeport 1, Connecticut

CIRCLE INFORM-A-GRAM KEY NO. 1452

REDUCE THREADING COSTS BY HALF! (or more!)



CUTTING. Normal tool operation, with cutter accurately positioned by ball and cone, and held in position firmly by downward forces.



REVERSING. Tool releases on cone when forces are reversed, riding up and tipping freely to follow thread without marring or scratching (even on aluminum). Ball and cone are specially fitted to release freely yet reposition cutter as accurately as a solid holder.

SPEE-D-THRED
REVERSE-RIDING TOOL HOLDER

Single-point threading on an engine lathe can now be done in *half* (and less) of the usual time with the new SPEE-D-THRED tool. You simply *reverse the lathe* at the end of each cut. The tool rides free on the thread without scratching or marring on the return trip, then repositions accurately and solidly when the next cut starts.

NO WASTE TIME

During the return stroke you can set in the feed for the next cut without stopping the lathe. No need to back off the cross slide. No need to disengage the feed nut, lead screw stays in registration. No need to match an index mark. *You save all this time* and you cut scrap to the vanishing point!

WRITE FOR LITERATURE

On your request we will send promptly detailed literature describing further valuable features of the operation of this remarkable tool. Ask for Bulletin ST 656.

WARNER DEVELOPMENT CO.
BOX 33, SOUTH BELOIT, ILL.

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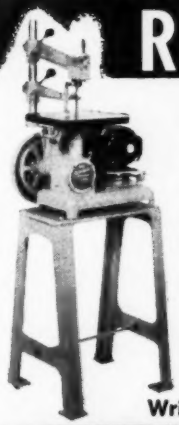
Smoother Production! Higher Output! Lower Costs!

RICE-MILWAUKEE



DIE FILERS . . . for straight-line sharp corner filing, sawing and lapping.

This low cost precision-built unit performs all die making operations at savings up to 40%. Furnished complete with motor and two overarms. No extras to buy.

PROFILE GRINDERS

. . . for high speed Precision Grinding of Curved and Irregular Contours.

Standard features include 20,000 or 30,000 R.P.M., or a combination of these spindle speeds, ½ H.P. motor, Collet Chuck, Compound tilting table, built-in wheel dresser.

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THE MOST PROGRESSIVE FIXTURE CLAMP LINE

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Low Cost Automatic
HORIZONTAL STOCK REEL

Self-powered

24" dia. $85.00
30" $90.00
36" $95.00

Write for details

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96 High St., Hingham, Mass.

CIRCLE INFORM-A-GRAM KEY NO. 1456

BUSY '57 FORECAST BY TOOL & DIE MEN

Contract tool and die plant owners who attended the National Tool & Die Manufacturers Association convention in Hartford, Conn., were almost unanimously convinced that the '57 sales picture for their industry looks especially bright. Their optimism was supported by Murray Shields, New York economist, who told the convention that '57 should be a generally good business year.

The tool and die manufacturers expect the '57 volume of shipments of special tooling to be "considerably higher than $800-million," which would make this the all-time record year to date. Industry representatives from all parts of the country are looking forward to another good year in '57. Most plant owners stressed the fact that since they have only small backlogs, their predictions could not with confidence be projected much beyond the early part of the year. High spots from key areas include the following:

Detroit: Tool and die plants, which have enjoyed an unusually busy year because of the major '57 model changeovers by the automotive industry, anticipate an increase in '57. Many orders are already in for '58 auto retooling.

Philadelphia: This city is also strongly affected by the auto industry. One owner said he was "greatly optimistic" and that his force would be busy for at least six months. Most plants are now working overtime, averaging 50 hrs a week.

New England: Increasing tooling orders in connection with aircraft, missiles and other government projects will improve the situation here, and one or more large tooling programs now being farmed out will make a difference.

Los Angeles: Southern California tool and die men see a "very good year." A large influx of business is anticipated for right after the first of the year, most of it defense work. Some plant owners report backlogs for the first time.

New York City: This center, which also serves a wide range of production industries and is therefore a good yardstick, also looks forward to '57 with confidence. One owner said he expects his plant to be very active and added that others had told him they will have "all the business they can handle."

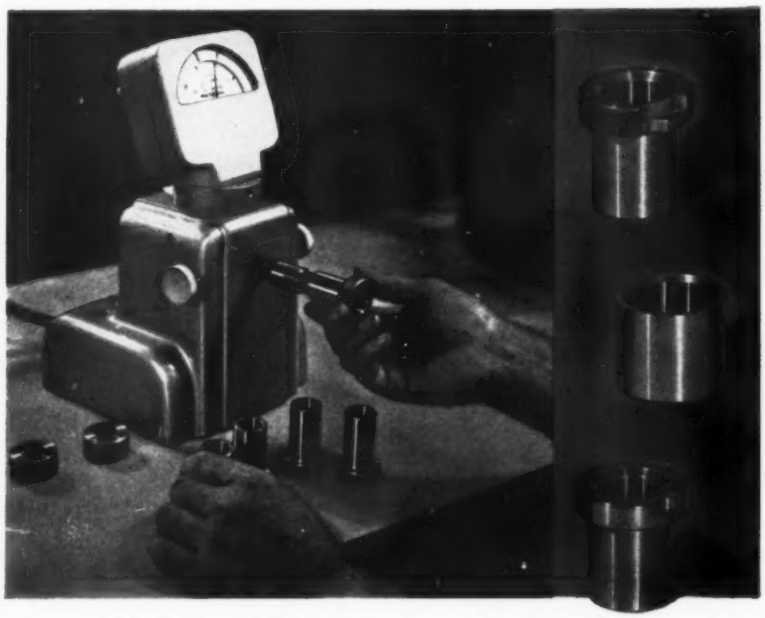
Herbert Harig

Philip R. Marsilius

Jack Kleinoder

Robert C. Renner

Harold G. Murdock



EX-CELL-O BUSHINGS LAST TWICE AS LONG

Customer's test proves there is a difference in bushings

New tests by major equipment manufacturer proved beyond doubt Ex-Cell-O Bushings last *twice as long as other bushings!* After drilling 16,300 holes, wear on other bushing brands averaged .0039"—ready for scrap! Wear on Ex-Cell-O Bushings averaged only .0017".

Here's why: (1) Ex-Cell-O Bushings are made of high chrome and high carbon oil-hardening bearing steel, (2) automatic atmosphere-controlled heat treating for uniform hardness, (3) precision grinding inside and out, (4) head type bushings and liners are ground under the head for perfect seating.

Call your Ex-Cell-O Representative or write Ex-Cell-O, Detroit. You'll get same day shipment.

EX-CELL-O CORPORATION DETROIT 32, MICHIGAN

EX-CELL-O FOR PRECISION XLO

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

56-58

CIRCLE INFORM-A-GRAM KEY NO. 146

New officers of the National Tool & Die Manufacturers Association, elected at the convention, include: Herbert Harig, president of Harig Manufacturing Corp., Chicago, elected president; Philip R. Marsilius, vice president of The Producto Machine Co., Bridgeport, Conn., first vice president; and Jack Kleinoder, secretary-treasurer of Volkert Stampings, Inc., Queens Village, N. Y,. second vice president. Robert C. Renner, president of The East Dayton Tool & Die Co., Dayton, Ohio, was re-elected treasurer; and Harold G. Murdock, vice president of Arrowsmith Tool & Die Corp., Los Angeles, re-elected secretary. George S. Eaton and Charles R. Bender continue as executive secretary and assistant executive secretary, respectively.

PRECISION GRINDER FOR LARGE LIGHT-WEIGHT WORKPIECES

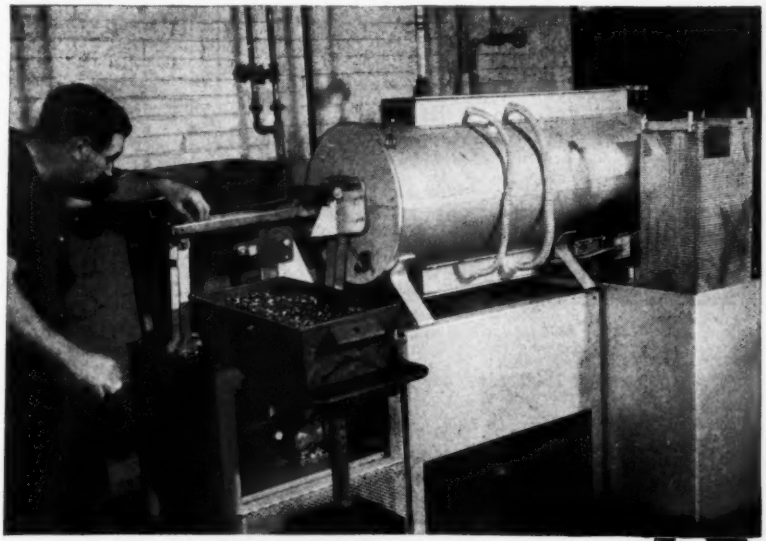
A new cylindrical grinding machine, for precision grinding of large, relatively lightweight workpieces, will accommodate work lengths of 48", 72" and 96", and will handle work up to 30" in diameter.

This new 30" Type LCTU semi-automatic cylindrical grinder built by Norton Company has wide tables and ways built into the machine to provide rugged support to the work. Wheel spindles run in long, full bearings, pressure lubricated. Automatic or manual wheel feed settings are speeded by means of "click-count" wheel feed index with which feed increments as fine as 0.0001" in diameter reduction are set without visual attention. Wheel feed is accomplished by means of a rotating screw type automatic wheel feed mechanism for maximum repetitive accuracy.

The automatic cycle is actuated with a single lever, located at the operator's position, and terminates either manually or by an electrically timed control. A jogging lever permits fractional rotation of the work to the most convenient position for loading or inspection.

Operation is also simplified by a pre-set table truing and grinding speed control feature. This permits maintenance of separate table speeds for truing and grinding as set from the first workpiece. It provides either speed immediately thereafter by short movement of the table control lever. Constant resetting of table speeds is avoided. Work rotation start-stop and coolant flow cycle are controlled automatically with the grinding cycle or manually, as desired. A selector switch is provided for this purpose.

A wide variety of optional accessories for the 30" LCTU increases its efficiency for special jobs. Locating devices, automatic wheel truing, automatic compensation of wheel head setting after truing, and a lever operated device which moves the grinding wheel into a shoulder to be ground, are available as extras.



RAYMOND MFG. CO.

"Bright" Hardens Precison Springs in a HEVI DUTY SHAKER HEARTH FURNACE

"We bright harden carbon, vanadium, and stainless steel springs without distortion in our Hevi Duty Shaker Hearth Furnace," says the Raymond Mfg. Co. of Corry, Pennsylvania.

Hevi Duty standard Shaker Hearth Furnaces will carburize, nitride, dry cyanide or bright harden up to 150 lbs. of small parts per hour. Operation of this production machine is semi-automatic.

Write for bulletin HD-850 today.

HEVI DUTY ELECTRIC COMPANY

MILWAUKEE 1, WISCONSIN

Heat Treating Furnaces... Electric Exclusively

Dry Type Transformers *Constant Current Regulators*

CIRCLE INFORM-A-GRAM KEY NO. 147

ALL in ONE TOOLHEAD*

BORING
FACING
TURNING
GROOVING
UNDER CUTTING

SIX SIZES AVAILABLE

ALL HAVE POWER FEED FOR FACING

* A BORING HEAD THAT WON'T FACE IS NOT COMPLETE

Model "D"

WRITE for COMPLETE DETAILS

CHANDLER TOOL CO.
Muncie, Indiana

COMBINED BORING & FACING TOOL HEADS
Chandler-Duplex

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ARROW TOOL & REAMER CO. • Established 1916

Arrow means a complete LINE OF END MILLS

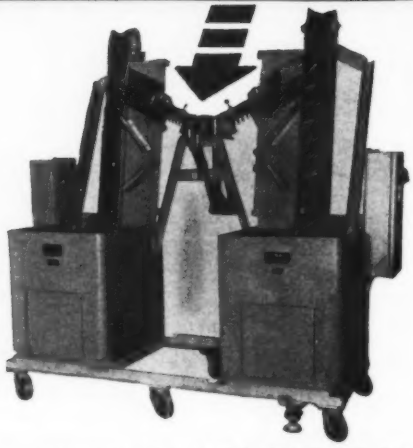
THIS IS Arrow's 3 FLUTE END MILL

Manufacturing skill and tool making experience for over 37 years — adds up to preference for Arrow End Mills.

ARROW TOOL & REAMER CO.
418-422 Livernois Ave. • Detroit 9, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 1483

DUPLEX FEEDALL UNIT
FEEDS 2 Different Parts
. . . AT SAME TIME
. . . IN 4 STREAMS



This ingenious arrangement of 2 Model 2200 Feedall Units was necessary to feed two different sizes of headed parts in two streams each to an Avey Automatic Drilling Machine. Notice that the unit is made fully portable by being built on a steel base with heavy casters.

Tell us your automatic feeding problems and let our engineers help you.

FEEDALL INCORPORATED WILLOUGHBY, OHIO

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BRYANT TRUE GRANITE
ROCK of AGES
SURFACE PLATES

Unequalled Wear Resistance!

All Bryant Surface Plates are manufactured from fine-grained *true quartz* granite. Their resistance to wear surpasses *all* other materials used as surface plates.

Patented "head of the grain" finishing process gives added assurance of retained accuracy through years of use.

Full range of sizes available from the same selected black-and-white true granite, in precision, standard and layout accuracies.

Convenient stands feature both utility and appearance.

Write for quotation, stating size and accuracy desired

BRYANT GAGE & SPINDLE DIVISION
Box 620-H, Springfield, Vermont

Granite Surface Plates • Groove Gages • Internal & External Thread Gages
Magnetic Drum Memory Devices for Computing Systems
DIVISION OF BRYANT CHUCKING GRINDER COMPANY

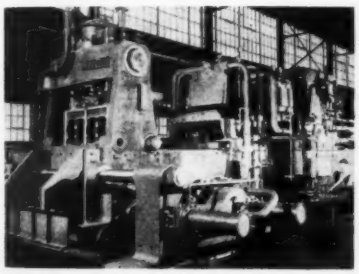
CIRCLE INFORM-A-GRAM KEY NO. 1484

AUTOMATIC SCRAP DISPOSAL

To meet the demands of modern automobile and body plants for automation, a manufacturer of scrap-presses has installed in a number of automotive plants a new type of scrap-press unit for baling unprecedented tonnages of steel sheet-scrap.

This particular scrap-press built by Logemann Brothers Company, Milwaukee 45, is a triple-compression unit having a box 10′ long x 5′ wide x 4′ deep. First compression lengthwise through the box reduces the scrap charge from 120″ to 20″ at the forward end; second compression downward reduces the 48″ dimension to 20″, and third compression from one side reduces the 60″ width dimension to a variable, depending on the quantity and character of scrap charged, usually 20″ to 30″.

The cover and all rams are retracted simultaneously with the opening of a section in the forward end of the bottom of the press, which permits the finished bale to drop out and then closes immediately. The bale discharge opening across the bottom is full box width in one dimension and 28″ in the other, so that even oversize bales discharge speedily without interference. The two horizontal rams are retracted by compressed air, the overhead ram by hydraulic power, and cover is hydraulically operated.



A pre-loading hopper straddles the press box, and this hopper usually receives scrap from a scrap conveyor. The hopper can be linked to a scale and set to trip when the hopper charge reaches a predetermined weight. When the automatic opening of the hopper-bottom permits the scrap to slide into the press box, the feed conveyor usually stops automatically, then instantly resumes feeding while the press cover closes over the charge and the press goes through its motions.

Timing can be so accurate that the hopper is again filled by the time the previous bale has dropped through, the bottom of the baler-box has closed, and the cover is back in place. Operation repeats, in some automotive plants on the basis of 24 hrs/day. As each bale drops from the bottom of the press, a chute can divert it or a bale-pusher can be incorporated to move it to a conveyor carrying it to a freight car outside the building.

Any interference with the passage of the bale electrically interrupts all motion until such obstruction is cleared. If for any reason whatever, opening in the bottom of the press box remains partially open or if the press cover has not completely retracted, the loading hopper does not trip or drop its load.

Time cycle from bale discharge to bale discharge ranges between 30 and 38 sec, with a variation in bale weights between 1000 and 1200 lbs, depending on the character of the scrap.

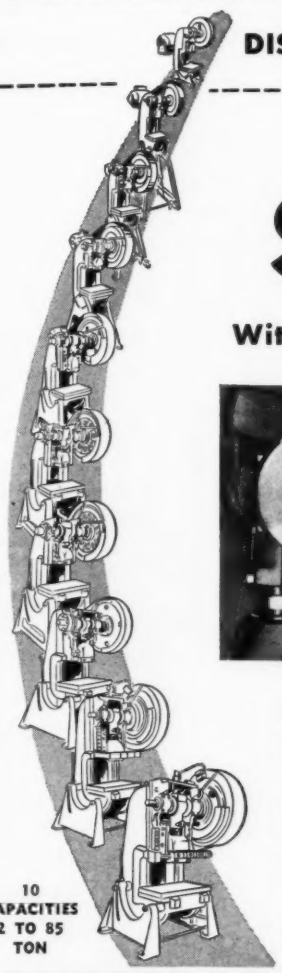
Operation is entirely automatic. The supervising operator, with his electrical control-board, can be remotely located. In some cases a closed-circuit television screen is used to show the operator the loading of the press and hopper. Emergency stop buttons can instantly interrupt all operations if this should become necessary.

DISCOVER THE "difference"

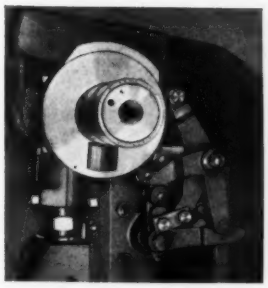
in

SAFETY

With PRESS-RITE POWER PRESSES



10 CAPACITIES 2 TO 85 TON



PRESS-RITE Single Stroke Non-Repeat Mechanism is operated mechanically with two positive cams . . . a superior design found only on PRESS-RITE PRESSES!

More and more press users are standardizing with PRESS-RITE'S because of SAFETY. The PRESS-RITE Single Stroke Non-Repeat Mechanism is the safest on presses today. Operators have confidence in PRESS-RITE PRESSES. This keeps efficiency and production high . . . and insurance rates low! Make your next press . . . PRESS-RITE . . . and be safe! Air operated clutch and brake also available, optional.

Press-Rite Division of Sales Service Machine Tool Company, 2351 University Avenue, St. Paul, WI4, Minnesota.

FREE CATALOG Write for Press-Rite catalog No. 855 with illustrations and specifications of all models, 2 to 85 ton capacity.

USED BY MORE . . . FOR MORE PRODUCTION

PRESS-RITE

OPEN BACK • INCLINABLE *Power Presses*

CIRCLE INFORM-A-GRAM KEY NO. 149

NUMBERALL
CUTS THE COST OF STAMPING NUMBERS!

AUTOMATIC INDENTING NUMBERING HEAD - MODEL 50

Automatic indenting numbering head for consecutive or repeat numbering. 1/32" up to 3/8" high figures can be furnished in sharp face Gothic or shaded Roman figures. Can be used in foot or power presses. Numbers: radio, airplane, tool parts, name plates, and other objects in brass, steel, fiber, plastics. Heads are of sturdy construction and give uninterrupted marking service. Catalog TP-50 on request.

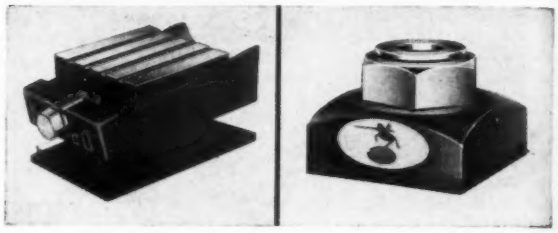
Prompt delivery of most sizes.

Specialities in making devices for stamping details into Nameplates, such as Automatic and Non-Automatic Numbering Machines, Type and Type Holders, and Chases, etc.: also Presses

NUMBERALL STAMP & TOOL CO.
HUGUENOT PARK STATEN ISLAND 12, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1501

any new machine deserves an
EMPCO *leveling jack*



DEPENDABLE MACHINE SUPPORT WITH BUILT-IN PRECISION LEVELING

Installing new machines? *Set* them level, and *keep* them level with EMPCO Leveling Jacks. EMPCO jacks provide a solid, smoothly adjustable foundation for machine tools, large surface plates, automation lines, tool room and production equipment of all types. The result is better machine performance . . . higher precision . . . reduced downtime and maintenance. Where vibration problems exist, use VI-SORB Mounting Pads with your EMPCO Jacks. They control internal and transmitted vibration, reduce noise and prevent creepage (eliminate the need for anchor bolts in many cases). EMPCO Jacks are available in six styles, 25 models. VI-SORB Mounting Pads are cut to fit. Write us about your machine installation problems.

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The Enterprise Machine Parts Corporation
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EMPCO LEVELING JACKS

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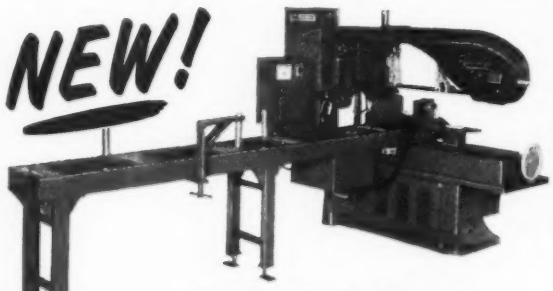

Wells Roto-Veyor
AUTOMATIC BAR FEED

The Wells Roto-Veyor is an entirely new concept in automatic bar feeds. Designed specifically for use with the Wells Model 1200 Band Saw, the Roto-Veyor converts it into a heavy duty completely automatic cut-off machine.

All conveyor feed rollers are mechanically powered —electrically controlled. The Roto-Veyor is capable of unlimited projection length. Feed mechanism and stock clamping action is synchronized with the saw to provide accurate repetitive cutting.

The Roto-Veyor will improve the saw's efficiency, save time, and reduce production cutting costs. *Write today for complete information.*

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NEW 1957 SELF CONTAINED IMPROVED MODEL

FEATURING

- ✓RIGID FLOOR BASE - ELIMINATING EXTRA CHARGE FOR TABLE
- ✓TILTING STAGE FOR HELIX, ANGLES AND BEVELS
- ✓4" DIA. STAGE OPENING
- ✓COLUMN SLIDE ADJUSTABLE FOR WEAR BY MEANS OF GIBS - WILL HOLD SQUARE INDEFINITELY.
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- ✓AN ENTIRELY NEW PRACTICAL DESIGNED TOOL FOR INSPECTION DEPARTMENT AND PRODUCTION SHOP.

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BELT GRINDING ADAPTED TO MOTOR ROTOR FINISHING

Through use of a specially fixtured abrasive belt grinder, small electric motor rotors can be finish ground to 0.0001" concentricity tolerances, four to five times faster than by conventional methods.

The new adaptation, developed by Engelberg Huller Company, Syracuse, N. Y., is a modified platen-type machine equipped with oscillating hydraulic in-feed table and pneumatic cylindrical grinding fixture.

Rotors, ranging in size from ⅜" to 1½" stack (width) and from ½" to 1½" dia, are multiple loaded on a slide fit arbor and inserted in carbide-lined V-blocks of work holding form. The air-operated cylindrical grinding fixture, mounted on automatic in-feed table, consists of three 6" dia rubber wheels, with 1½" face. The regulating wheels, at 12 rpm, revolve the rotors against the abrasive belt, which is backed by a hardened steel platen with ½" carbide insert behind contact area.

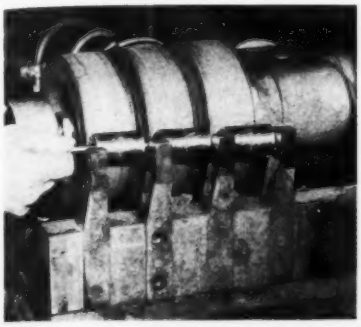

Fig. 1. With hydraulic feed table in load position a slide fit arbor shaft, loaded with six shaded pole rotors, is inserted in carbide-lined V-blocks of holding fixture.

The modified Engelberg Model BG8/FT9 is equipped with a two-speed hydraulic in-feed table. From the load position, the first speed allows for rapid approach to the grinding belt; a microstop regulates the second or machining speed as the revolving rotors are moved in against the belt until a pre-determined size is reached. At the same time, to equalize belt wear, rotors are moved back and forth across the belt face by means of an air cylinder oscillator attachment on the machine table.

The machine permits concentricity tolerances down to 0.0002", and diameter tolerance of ±0.0005". The complete grinding cycle — loading, grinding, and unloading — requires about 12 sec. Depending on width and diameter of rotors, production rates can exceed 2000 rotors/hr.

Preliminary tests and production data on the first installation — at Olsen Machine and Tool Company, North Abington, Mass. — indicate that rotors, either riveted type or die-cast, should be lathe turned or die-trimmed to within no more than 0.010" oversize for final presentation to the abrasive belt machine. Production data above, on a-c shaded-pole rotors, is based on 0.005" stock removal. Rotors were copper and CR silicon steel laminated into stacks from ⅜" to 1½" thick.

The belt grinder eliminates the need for fixing rotor shafts prior to finish grinding, formerly necessary for locating purposes. As many as 12 rotors, depending on width, can be nested simultaneously.

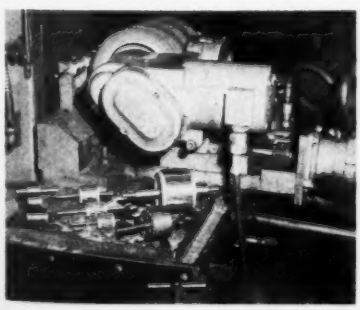

Fig. 2. Pneumatic fixture moves forward until revolving regulating wheels contact rotors. Machine table then carries rotors in against abrasive belt until pre-determined size is reached.

CIRCLE INFORM-A-GRAM KEY NO. 151

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The Standard Parts Company
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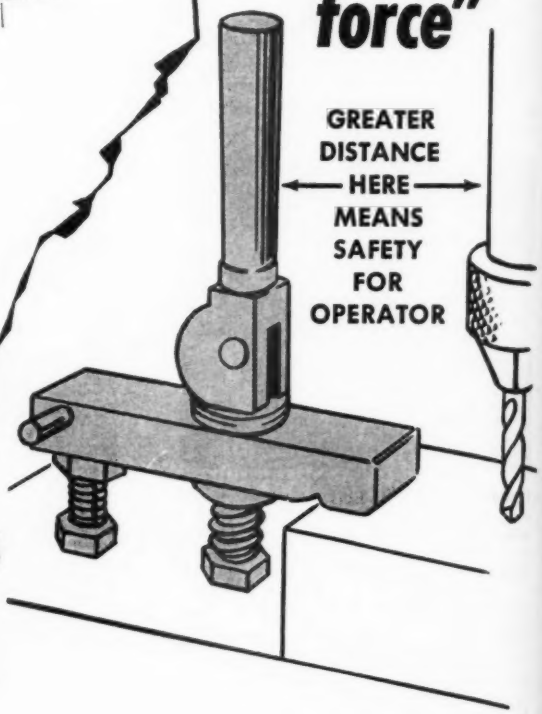
Bedford, Ohio
Re: Our Order M-7281
Gentlemen:
With reference to the Double Cam-Lever (500) and Eye-Bolt (500), we have conducted experiments to determine the amount of clamping force a man can exert with this device, lubricated.
Without the use of any auxiliary equipment, it was found that a man could exert up to 3,450 pounds, by bringing the lever to a position 90° with the Eye-Bolt.



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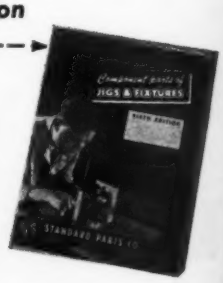

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A4	A22	A40	A58	A76	B18	B36	B54	C1	E7
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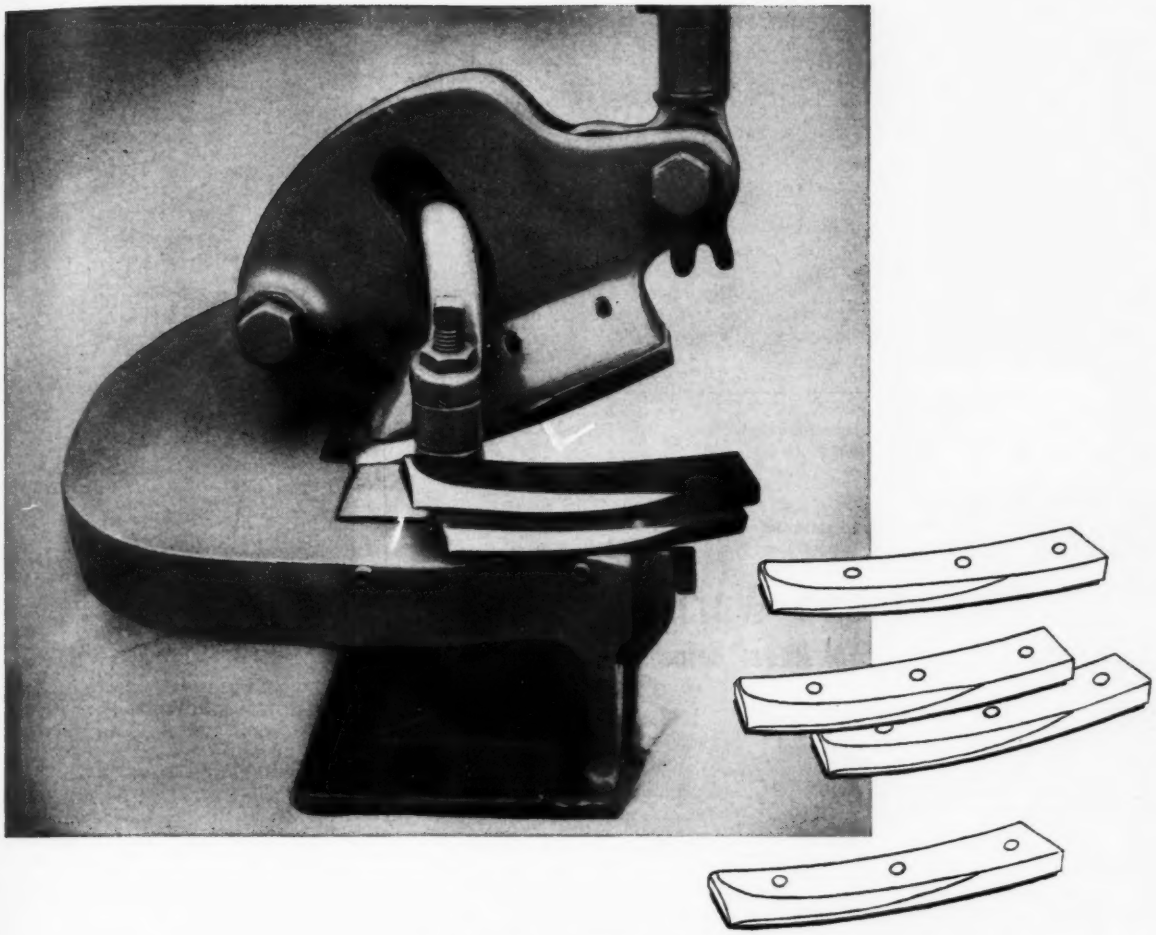

Shear Manufacturer ups blade life 4 to 5 times...

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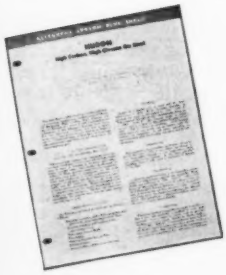

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For nearest representative, consult Yellow Section of your telephone book.

For complete **MODERN** Tooling, call

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AUTOMATED BROACHING MACHINE

Automated broaching equipment, recently developed for use by one of the leading automobile builders, has been designed for uninterrupted, continuous, high production of internally broached splines used in transmission components. The parts to be broached are supplied to this machine from a conveyor line and are automatically broached, two at a time, and ejected to a continuing conveyor.

The machine shown in Figure 1 is completely tooled for this operation. The basic machine is an Acme VPD-10-36 vertical pull down internal broaching machine built by Acme Broach Corporation of Milan, Mich. It is equipped with broach handling cylinder and automatic cycle for electrical operation.

Figure 2 shows a closeup of the automatic fixture where parts are fed from left to right and pushed in front of a loading slide. The loading slide pushes two pieces at a time under the broaches, at which time the broaches move downward through bores in the workpieces and are drawn through the cutting stroke while the loading slide returns outward.

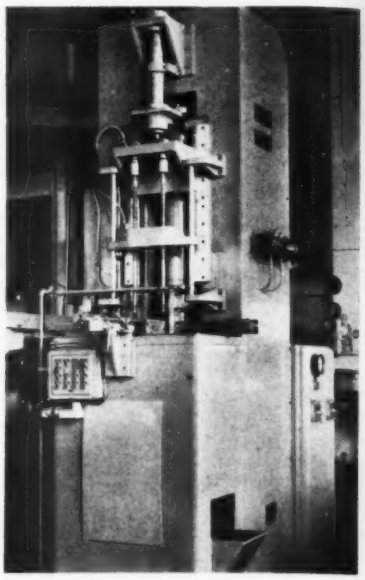


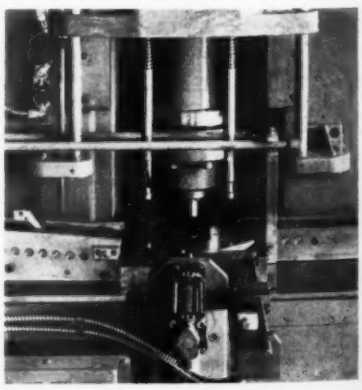
Fig. 1.

After broaches have reached the end of their downward stroke and are clear of the workpieces, the left to right slide again moves out pushing two completed parts out of the way and bringing additional workpieces in front of the loader slide.

The ejector slide then returns to the left; broaches retract upward through the open bores, are picked up, and raised clear of the workpiece so that two new parts may be pushed into broaching position by the loader slide.

When operating, the machines continue to cycle automatically—feeding, broaching, and ejecting the completed workpieces. A selector switch allows for manual cycling for setting up and checking purposes. One of these units will produce 250 completed pcs/hr at 100% efficiency.

Fig. 2.



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For Production or Tool Room Grinding Operations

The Type NRK UNIVERSAL Thread and Worm Grinder is designed for grinding with single or multi-thread wheels. This machine, with attachments, can be used for grinding and relief-grinding of external — right- and left-hand — single or multiple screw threads — to any desired profile.

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Admits work pieces between centers	28"
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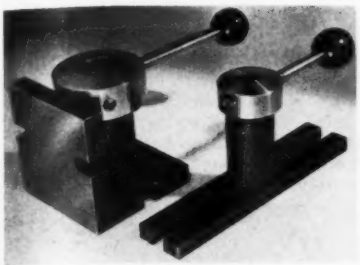

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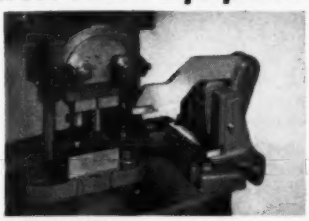

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up to 3" width and .062 thickness	up to 10" width and .100" thickness
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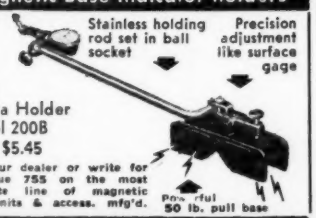

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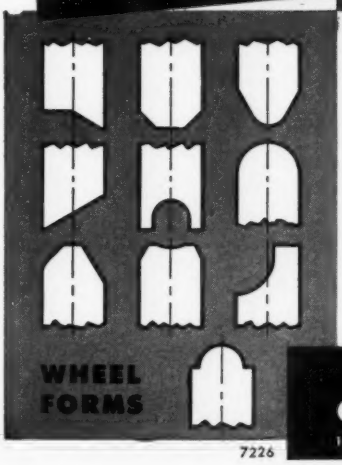
Precision Dress Grinding Wheels to ANY FORM IN ¼ THE USUAL TIME



The Perfex TANGI-MATIC Dresser is a self-contained precision tool built by an organization of master gagemakers for high precision work.

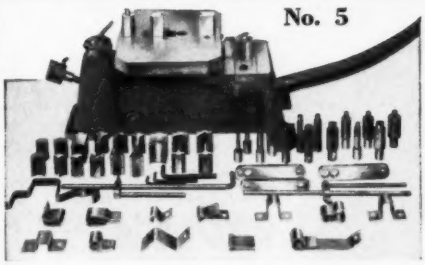
Any shop man who can read a "mike" can operate the dresser the first time. No Jo Blocks, no height gages or other auxiliary tools needed. All radii and angles are read directly.

Write for Descriptive Bulletin

ACCURACY IS OUR CREED
PERFEX

PERFEX GAGE & TOOL CO.
123 AVERY ST. • MT. CLEMENS, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 1555



Multiform

BENDER-CUTTER

CUTS, BENDS, PUNCHES

Available in hand or air operated models, the MULTIFORM is shipped complete with full assortment of dies and mandrels to form and cut round or flat stock up to ⅛"x1½" as illustrated. Punching and round end blanking dies available. Other models up to ¼"x4" air operated.

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ALSO AIR OPERATED MODELS

J. A. RICHARDS CO. KALAMAZOO, MICH.

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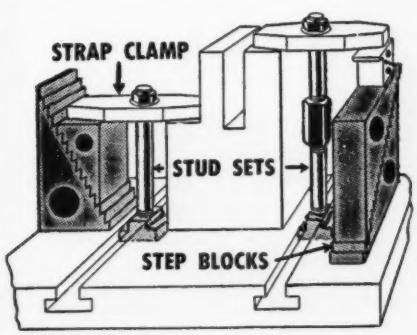


SURE-GRIP STEP BLOCKS

Clamping tools of all types.

Write for free tracing templates

TIETZMANN TOOL CORP.
Box 277
North Main St., Englewood, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 1557

MACHINE TOOL SALES TO HIT BILLION DOLLAR MARK

An annual billion dollar base for shipments and new orders for the nation's machine tool industry was predicted by Louis Polk, president of the National Machine Tool Builders' Association, at the group's annual meeting in Chicago.

"Machine tool shipments for the year," Polk said, "will approach $900-million. Orders during '56 will apparently match or exceed '55's net new orders of above $927-million.

"This present continuing peacetime performance is evidence that, for the foreseeable future, approximately a billion dollars a year on the average — both in shipments and new orders — can be a practical continuing probability for the machine tool industry."

In the last five years, Polk continued, the machine tool industry has increased its annual volume at a rate twice as rapid as the overall growth of our total national economy. While the gross national product climbed from $285-billion in '50 to an estimated $408-billion in '56, machine tool industry shipments have climbed from $305-million in '50 to approximately $860-million in '56.

the new concept of vertical measurement is here
Webber Micro-Accurate
OPTICAL HEIGHT GAGE
This revolutionary new instrument will make micro measurements in the 1" to 61" range with an hitherto unknown overall accuracy of ± .000005" per inch.
These fantastic measurements are made speedily and easily by the average skilled workman.
Next to your Gage Blocks the new Webber Optical Height Gage will be the most useful tool in your shop. There is nothing like it in all the world.
Webber GAGE CO.
12903 Triskett Rd., Cleveland 11, Ohio
Webber Micro-Accurate Gages
LARGEST EXCLUSIVE MANUFACTURER
OF PRECISION GAGE BLOCKS
CIRCLE INFORM-A-GRAM KEY NO. 156

Jerome A. Raterman

Alfred V. Bodine

Ralph J. Kraut

Perrin G. March, III

Walter K. Bailey

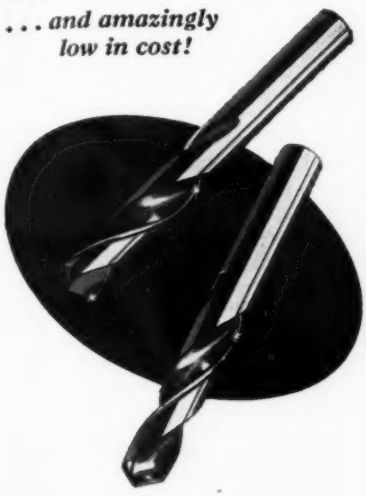
Jerome A. Raterman, president of The Monarch Machine Tool Co., Sidney, Ohio, was elected president of the association at the meeting. Alfred V. Bodine, president and treasurer of The Bodine Corp., Bridgeport, Conn., first vice president; and Ralph J. Kraut, president of the Giddings & Lewis Machine Tool Co., Fond du Lac, Wisc., second vice president. Perrin G. March III, president of The Cincinnati Shaper Co., Cincinnati, was re-elected treasurer. Walter K. Bailey, president of The Warner & Swasey Co., Cleveland, was named secretary.

Mr. Kraut, Mr. Bailey, and Edwin R. Smith, president and treasurer of the Seneca Falls Machine Co., Seneca Falls, N. Y., were elected directors of the NMTBA.

Ludlow King, assistant vice president of the NMTBA, was elected executive vice president, succeeding Tell Berna, who is retiring after 20 years with the association.

They're tough, they're versatile

. . . and amazingly low in cost!



ACE

STUB DRILLS

The short, heavy duty flutes of Ace Stub Drills are ground into top quality pre-hardened high speed steel to give you keener cutting lips, extra strength, longer drill life. Ideal for close-to-work screw machine operations and portable drilling. And they're now stocked in 140 standard sizes that cost approximately 20% less than equivalent jobber length drills!

Call your local Ace Drill Distributor today!

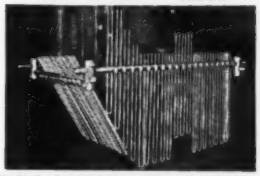
NEW CATALOG covers the entire line of Ace "Ground-from-the-Solid" High Speed Steel and Carbide Drills, Reamers, Drill Blanks and Special Drills. Send for it today!

ACE DRILL
ADRIAN, MICHIGAN

ORIGINATORS OF "GROUND-FROM-THE-SOLID" DRILLS

CIRCLE INFORM-A-GRAM KEY NO. 1571

ADJUSTABLE ROD GUARD
for Power Presses



HUMM SAFETY EQUIPMENT CO.
MFGR. OF COMPLETE LINE OF PRESS GUARDS
249 Sheffield Ave. • BROOKLYN 7, N. Y.

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CAMS

To Your Specifications

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— Except Screw Machine Cams —

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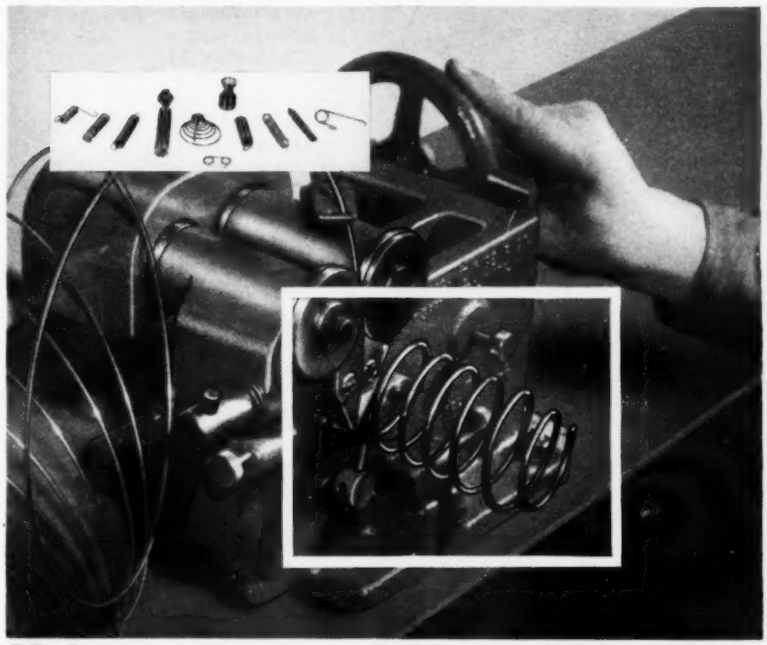
Design Assistance Offered

KIDDE PRECISION TOOL CORPORATION
10 Locust Ave., Roseland, N. J.

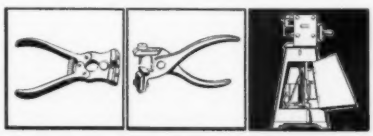
CIRCLE INFORM-A-GRAM KEY NO. 1573



Make any type spring . . . fast, exact!

WITHOUT USE OF ARBORS

For a replacement or experimental spring, any shape, diameter or pitch from flat or round wire sizes .005″ to .125″, you can produce it in a matter of seconds with Perkins Precision Spring Coiler. You eliminate arbors, yet turn out precision springs — torsion, compression, extension, tapered, or special springs, coiled either left or right hand, in any desired length, any diameter from 3/32″ to 12″ and larger, with or without initial tension, and with open or closed ends. Eliminate expensive special orders and costly production delays! Make your own springs to exact specifications as replacements or experimental work. Make them fast, right in your own shop!



Starret adjustable jaw cut nippers (left) and Gardener Hook-Kon spring looping tool (center) — handy, precision, time-saving accessories for spring coiling. Perkins Spring Coiler available as bench model or power model shown here, (right) for tool shop or continuous runs.

PERKINS
MACHINE AND GEAR CO.
Special Machinery Division,
West Springfield, Mass.

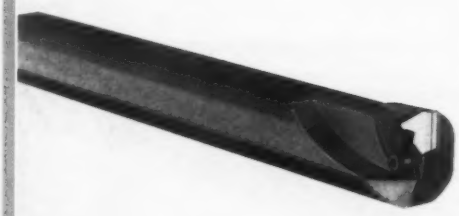
Perkins Machine and Gear Co.
Special Machinery Division, Dept. B1
W. Springfield, Mass.
Please send information and prices on Perkins Spring Coiler.
Hand Model ☐ Power Model ☐

Name.....Title.....
Company.....
Address.....
City.....State.....

CIRCLE INFORM-A-GRAM KEY NO. 1574

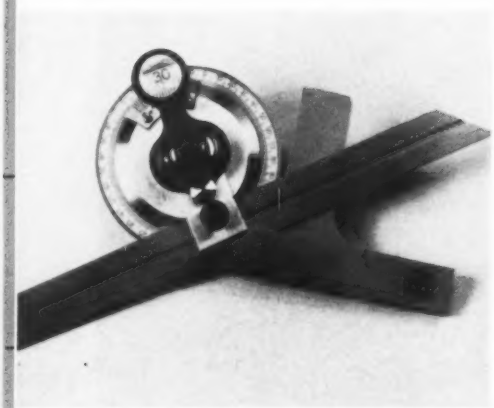
PRODUCTS

NEW DEVELOPMENTS · IMPROVEMENTS · COST AND TIME SAVERS



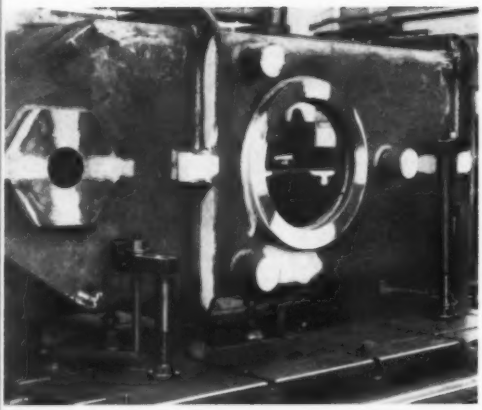
BORING BAR . . .

A Kendex triangular button insert which can be indexed accurately in seconds to give three cutting edges on each side of the insert, is a feature of this boring bar. When the six edges are used, the insert is replaced, eliminating grinding cost. Kennametal Inc., Latrobe, Pa., or —
Circle No. A1.



PROTRACTOR WITH MAGNIFIER . . .

An adjustable magnifier has been added to a universal vernier bevel protractor so that readings can be taken quickly and efficiently without eyestrain. The tool will measure any angle to 5 min. George Scherr Co., 200 Lafayette St., New York 12, or —
Circle No. A2.



Q-CLAMPS . . .

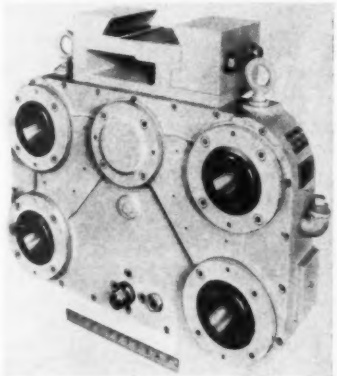
Using an adjustable heel support, the Q-clamp provides positive clamping pressure. The 70 interchangeable components of Series A set for clamping and jacking, arranged in a special rack, permit the operator to quickly set up any job. Clamp heights from 0″ to 50″, and higher, can be achieved. Techno Products, Inc., 1908 E. 66th St., Cleveland 3, or —
Circle No. A3.

PRESSROOM UNIT . . .

Feed presses with stainless steel, aluminum and brass, as well as any highly polished stock, without any danger of scuffing or scratching with the Sesco-Matic. It is a self-contained unit that can be moved from one location to another. Sesco Inc., 8881 Central Ave., Detroit 4, or —
Circle No. A4.

MILLING HEAD . . .

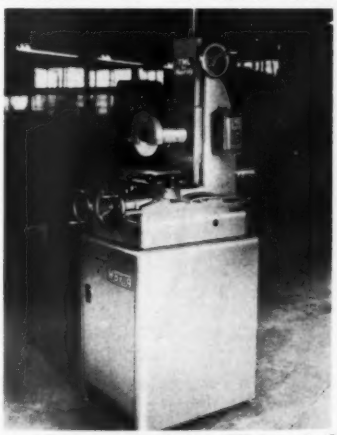
A specially-designed large fixed center milling head has been produced by Thriftmaster Products Corp., 1012A N. Plum St., Lancaster, Pa. Short type



milling machine spindles containing standard No. 50 taper were incorporated for using form cutters in steel plate. They also eliminate overhang and provide more rigid mounting of tools.
Circle Inform-A-Gram No. A5.

SURFACE GRINDER . . .

An improved version of the TML hand feed surface grinder is now being manufactured by Harig Mfg. Corp., 5757 W. Howard St., Chicago 31. It has 100% faster longitudinal travel per revolution of the hand wheel



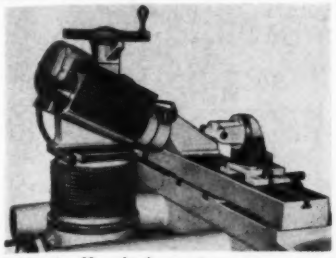
over former models. This grinder will accommodate standard wheel adapters. Transverse travel is 7″ and working height under a standard 7″ dia wheel is 12¼″. It can also be used as a bench model. **Circle No. A6.**

ON PARADE

Mail FREE Inform-A-Gram Card for MORE Details.

TOOL AND CUTTER GRINDER . . .

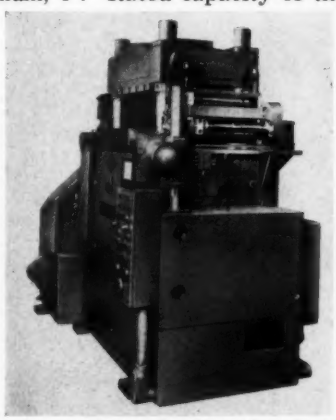
A 25° tilting spindle allows direct, positive setting of clearance angles on this Sterling G-2 tool and cutter grinder. Because the clearance angle is set by tilting



the spindle, it is not necessary to change the setting for different diameters of work. The spindle is also reversible and rotates 360°. McDonough Mfg. Co., Eau Claire, Wis., or —
Circle Inform-A-Gram No. A7.

STAMPING PRESS . . .

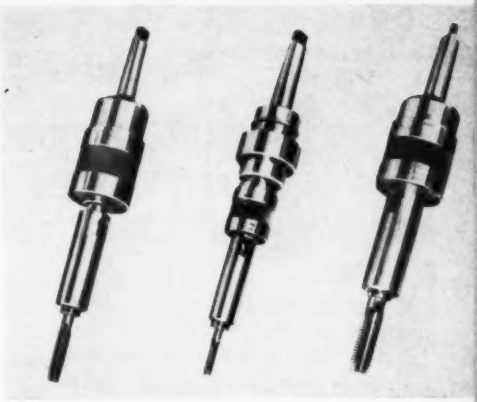
Long, unbalanced, progressive dies are handled without distortion by the Alpha 75-ton, double-crank direct-drive production press. This press is operated at the shoulder level of the operator. No pits are required. The standard stroke is 2", the maximum, 4". Rated capacity of the



press is 150 standard strokes/min. This press features complete clearance between the head rod posts from front to back, and from right to left. The feed mechanism is of the roll type and is designed as an integral part of the press. Alpha Press & Machine, Inc., 9281 Freeland Ave., Detroit 28, or —
Circle Inform-A-Gram No. A8.

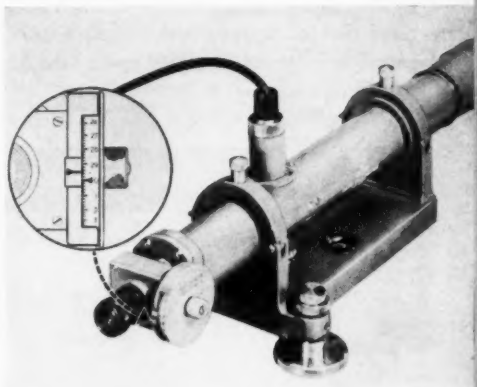
TAP DRIVERS . . .

Three additional styles of Safe-Torque tap drivers have been produced by Scully-Jones and Co., 1901 S. Rockwell St., Chicago 8. They are tension and compression, quick-change and heavy-duty types, featuring an overrunning roller drive design that releases instantly when preset torque is reached. **Circle No. A9.**



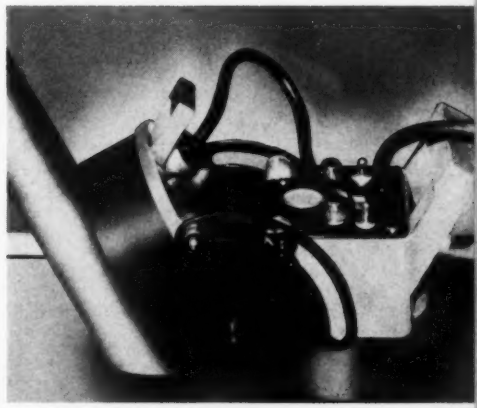
OPTICAL TESTING INSTRUMENT . . .

Direct Readings to 0.1 sec of arc are possible with the Watts Microptic Auto-Collimator. Its applications range from the testing of surface plates and machine tools to the control of ultra-precision gear cutting devices, etc. Engis Equipment Co., 431 S. Dearborn St., Chicago 5, or — **Circle No. A10.**



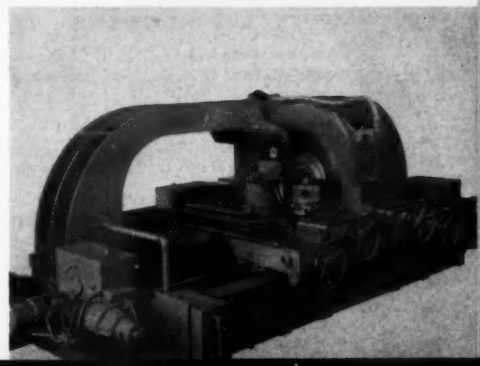
WELDING FIXTURE . . .

Hold ferrous metals rigidly in any position for welding without specially built fixtures with the Mag-Tool magnetic welding fixture. It insures absolute accuracy in welding large pieces of metal or small items. Magnetic Tool Corp., 1955 Lafayette St., Santa Clara, Calif., or —
Circle No. A11.



FACING LATHE . . .

CDF Model center drive facing lathe has been designed for profile facing such pieces as turbo-jet engine discs ranging to 44" O.D. Cutting tools mounted directly on opposite sides of the workpiece simultaneously turn both sides. Wickes Machine Tool, Div'n of The Wickes Corp., Saginaw, Mich., or —
Circle No. A12.



PRECISION CUTTERS!

MADE TO YOUR EXACT SPECS... SOLID CARBIDE, OR CARBIDE TIPPED!

Why put up with stock cutters, when made-to-order cutters cost no more? Cutters designed for specific gang-milling, slotting, venting, slitting or grooving operations in various diameters and thickness to suit YOUR needs exactly. Fast service: all component materials carried in stock. Top-flight reputation for dependability built since 1888. Furnish complete specs, quantities desired and material to be cut when requesting prices. Write for Bulletin No. 51

W. F. MEYERS CO., INC., BEDFORD, INDIANA

CIRCLE INFORM-A-GRAM KEY NO. 1601

NEW from ELGIN

Golden Circle

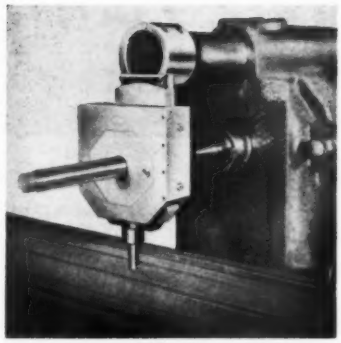
SOLID CARBIDE DRILLS and REAMERS

—precision machine ground. | —complete size range in stock, specials available. | —quality proved by Elgin for accuracy and long life.

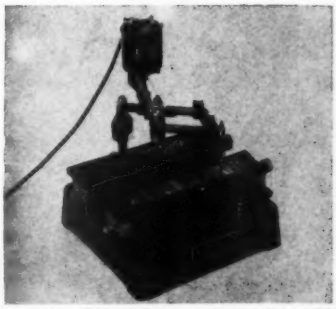
WRITE TODAY for details on this latest addition to Elgin's "Golden Circle" Rotary Tool Line of solid carbide burs and end mills.

ABRASIVES DIVISION, DEPT. D
ELGIN NATIONAL WATCH COMPANY
Elgin, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1602

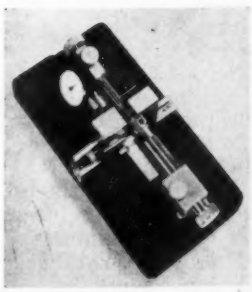


Change Horizontal Milling Machines into vertical shapers in a few minutes with the Vertical Mill-Shape attachment. Built for precision high speed work, it fits directly on any regular horizontal milling machine arbor. The attachment is available in two models, MS-1 and MS-2 (shown). Dorden & Co., 18750 Fitzpatrick Ave., Detroit 28, or — **Circle Inform-A-Gram No. A13.**



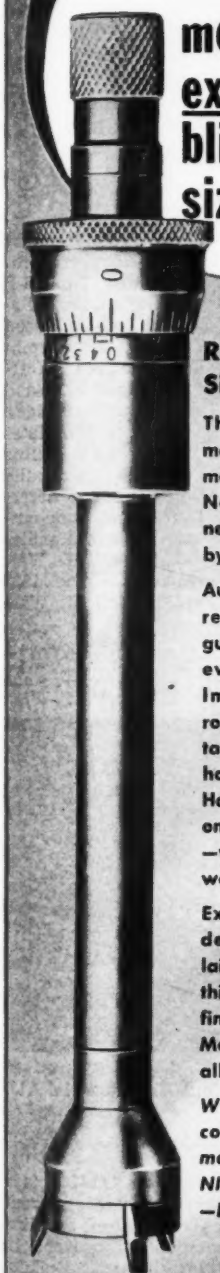
Engrave Six Sizes of Characters from a single master with No. 624 Pantograph, featuring six reduction ratios. This unit was developed for heavier work and more continuous use and extends the usefulness of the engraving machine when performing routing and milling operations in steel. Mico Instrument Co., 80 Trowbridge St., Cambridge 38, Mass., or — **Circle Inform-A-Gram No. A14.**

Model A-50 Turret Drilling Machine has been designed to meet the needs of industry for performing consecutive drilling, reaming, counterboring and tapping operations in large circular patterns, in one handling. Rotary fixtures up to 48" dia can be accommodated. Howe and Fant, Inc., 20 Fitch St., E. Norwalk, Conn., or — **Circle Inform-A-Gram No. A15.**



Easy, Accurate Reading of Helix Deviation is possible with this drunken thread checker developed by The Pipe Machinery Co., 29100 Lakeland Blvd., Wickliffe, O. Built ruggedly, this instrument can be used in any inspection or manufacturing department. For full details, contact the company, or — **Circle No. A16.**

Etalon INGAGE measures the exact bore or blind hole size



Reading: .0001"
Sizes: 3/16" to 1.6"

This unique new precision measuring instrument will take measurements of blind holes. No masters or setting rings needed — measures *directly* — by .0001".

Automatically aligns in holes, rectangular contact points guarantee extreme accuracy even when fully extended. Immediately detects out of round holes. Extensions facilitate accurate measurements of holes up to 6 feet in depth. Hardened contact points exert only 11 oz. measuring pressure —will not damage even fragile work.

Exceptionally easy to read, deep clean-cut graduations laid out on a large diameter thimble. Dull chrome plated finish. Furnished in English or Metric graduations, individually or in sets.

WRITE FOR CATALOG on complete line of precision measuring instruments: VERNIER CALIPERS—MICROMETERS —DIAL INDICATORS

ALINA

ALINA CORPORATION

122 East Second Street Mineola, L. I., N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1611

WOW!!!
UNBREAKABLE TAPS

SHEARCUTTER UNBREAKA TAPS

- Are practically unbreakable.
- End tapping trouble.
- Produce better tapped holes.
- Feed the chips out in front of the tap.
- Have an amazing long life.
- May be resharpened many times.
- Require only half the power generally required for tapping.
- Lower tapping costs.

SHEARCUTTER TOOLS COST *LESS*

These ultra-scientific cutting tools are used by practically every large manufacturing company in the U.S.A. Constant repeat orders prove their merit and value.

Patent Warning: All Shearcutter Tools protected by U.S. and Foreign Patents, received, pending or applied for.

SHEARCUT TOOL CO.

MANUFACTURERS OF THE WORLD'S MOST SCIENTIFIC CUTTING TOOLS

7045 Darby Avenue Reseda, California

CIRCLE INFORM-A-GRAM KEY NO. 1612

FREE!
NEW IDEAS
in how to "streamline" your production

FOR PRODUCERS OF LARGE QUANTITIES OF MULTI-MACHINED SMALL PARTS...

This booklet tells how to produce as many as *68 completely machined finished parts a minute!* It describes a transfer machine which performs a series of automatic machining operations—drilling, reaming, milling, tapping, boring, punching, riveting...

This production "wizard" permits machining from many positions—front, side, rear; horizontally, inclined, vertically. It is specially designed for precise machining of small and miniature parts (0 to 2 ounces), a variety of materials. Designed and built from production engineered, high speed unit heads for a *specific product*, this machine combines up to 14 second operations in one indexing cycle.

For a free copy of this NEW IDEA booklet use the coupon!

INTERMACHINERY CORPORATION
452 FIFTH AVENUE, NEW YORK 18, N. Y.
Production Tools for Automatic Machining of Precise Miniature Parts

Please send me *free* your 14-page booklet containing NEW IDEAS for "streamlining" my small parts production.

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Company .....
Address .....
City ..... Zone ..... State .....

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PRECISION CUTTERS!

MADE TO YOUR EXACT SPECS... SOLID CARBIDE, OR CARBIDE TIPPED!

Why put up with stock cutters, when made-to-order cutters cost no more? Cutters designed for specific gang-milling, slotting, venting, slitting or grooving operations in various diameters and thickness to suit YOUR needs exactly. Fast service: all component materials carried in stock. Top-flight reputation for dependability built since 1888. Furnish complete specs, quantities desired and material to be cut when requesting prices. Write for Bulletin No. 51

CIRCLE INFORM-A-GRAM KEY NO. 1601

NEW from ELGIN

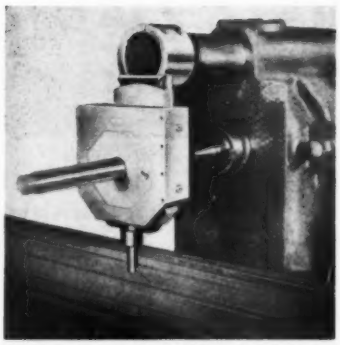
SOLID CARBIDE DRILLS and REAMERS

—precision machine ground. | —complete size range in stock, specials available. | —quality proved by Elgin for accuracy and long life.

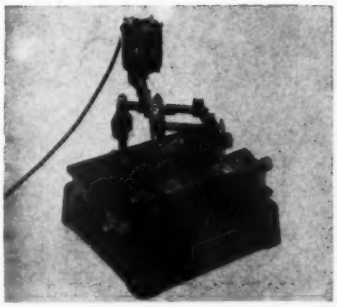
WRITE TODAY for details on this latest addition to Elgin's "Golden Circle" Rotary Tool Line of solid carbide burs and end mills.

ABRASIVES DIVISION, DEPT. D
ELGIN NATIONAL WATCH COMPANY
Elgin, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1602



Change Horizontal Milling Machines into vertical shapers in a few minutes with the Vertical Mill-Shape attachment. Built for precision high speed work, it fits directly on any regular horizontal milling machine arbor. The attachment is available in two models, MS-1 and MS-2 (shown). Dorden & Co., 18750 Fitzpatrick Ave., Detroit 28, or — **Circle Inform-A-Gram No. A13.**



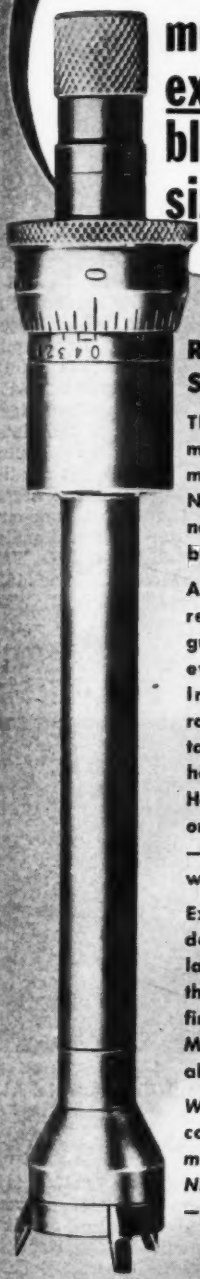
Engrave Six Sizes of Characters from a single master with No. 624 Pantograph, featuring six reduction ratios. This unit was developed for heavier work and more continuous use and extends the usefulness of the engraving machine when performing routing and milling operations in steel. Mico Instrument Co., 80 Trowbridge St., Cambridge 38, Mass., or — **Circle Inform-A-Gram No. A14.**

Model A-50 Turret Drilling Machine has been designed to meet the needs of industry for performing consecutive drilling, reaming, counterboring and tapping operations in large circular patterns, in one handling. Rotary fixtures up to 48" dia can be accommodated. Howe and Fant, Inc., 20 Fitch St., E. Norwalk, Conn., or — **Circle Inform-A-Gram No. A15.**

Easy, Accurate Reading of Helix Deviation is possible with this drunken thread checker developed by The Pipe Machinery Co., 29100 Lakeland Blvd., Wickliffe, O. Built ruggedly, this instrument can be used in any inspection or manufacturing department. For full details, contact the company, or — **Circle No. A16.**

Etalon INGAGE

measures the exact bore or blind hole size



Reading: .0001"
Sizes: 3/16" to 1.6"

This unique new precision measuring instrument will take measurements of blind holes. No masters or setting rings needed — measures *directly* — by .0001".

Automatically aligns in holes, rectangular contact points guarantee extreme accuracy even when fully extended. Immediately detects out of round holes. Extensions facilitate accurate measurements of holes up to 6 feet in depth. Hardened contact points exert only 11 oz. measuring pressure —will not damage even fragile work.

Exceptionally easy to read, deep clean-cut graduations laid out on a large diameter thimble. Dull chrome plated finish. Furnished in English or Metric graduations, individually or in sets.

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- Are practically unbreakable.
- End tapping trouble.
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- Feed the chips out in front of the tap.
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- May be resharpened many times.
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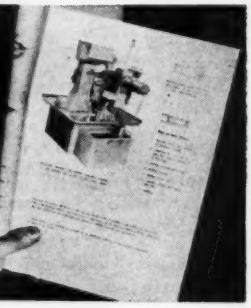
in how to "streamline" your production



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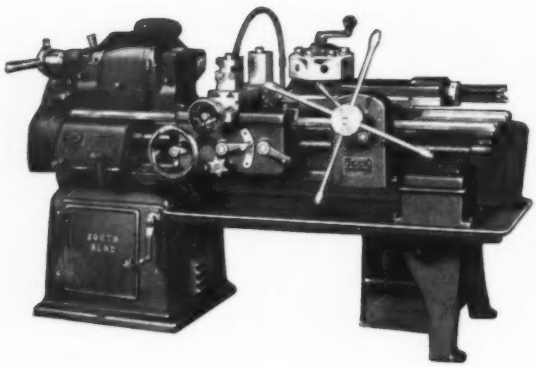

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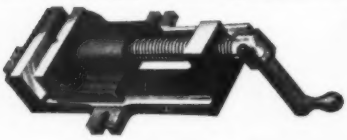

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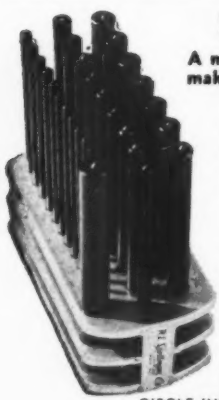

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Precision made of finest tool steel carefully heat treated and tempered for long life. .0025 undersize to facilitate use—black oxide finish.

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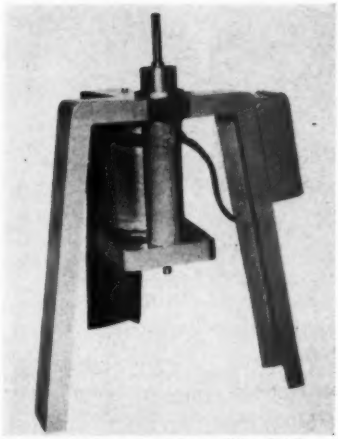

Higher Production and Greater Versatility are provided by No. 55-P profile router. Because of its speed the 10,000-rpm spindle assures effortless operation and smooth, clean edges. Plastic templates which can double as drill jigs are the only tooling necessary. The same cutter setup handles all jobs. J. D. Wallace & Co., Inc., 1029 N. Detroit St., Warsaw, Ind., or —

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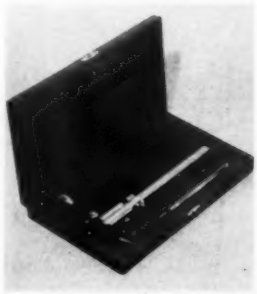

Accurate to 1/1000" is a precision vernier layout compass announced by Titan Tool and Supply, Dept. L, 1419 Hertel Ave., Buffalo. This compass is of the beam type, the scale acting as the beam. It is ideal for layout work on metal in toolrooms and die departments. The scriber is a companion piece to the compass.

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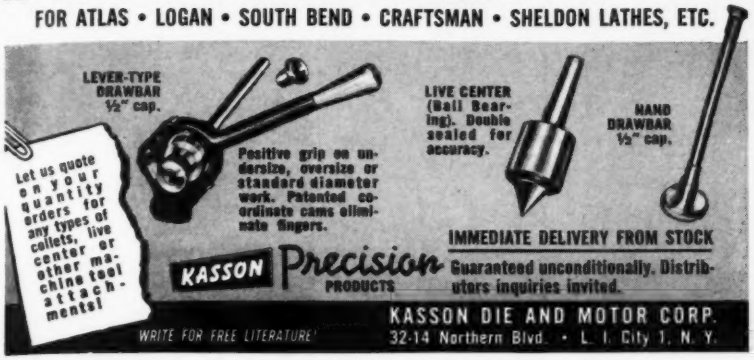
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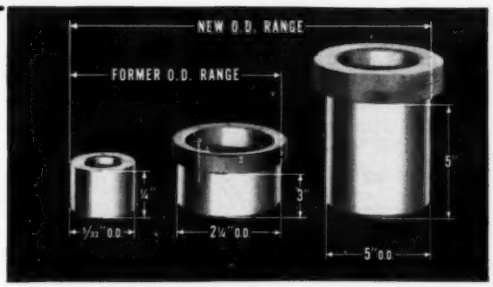

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For closest tolerance finishes to 1 RMS or less on plug gages, shoulders, all types of cylindrical parts. Available in floor and bench type models.

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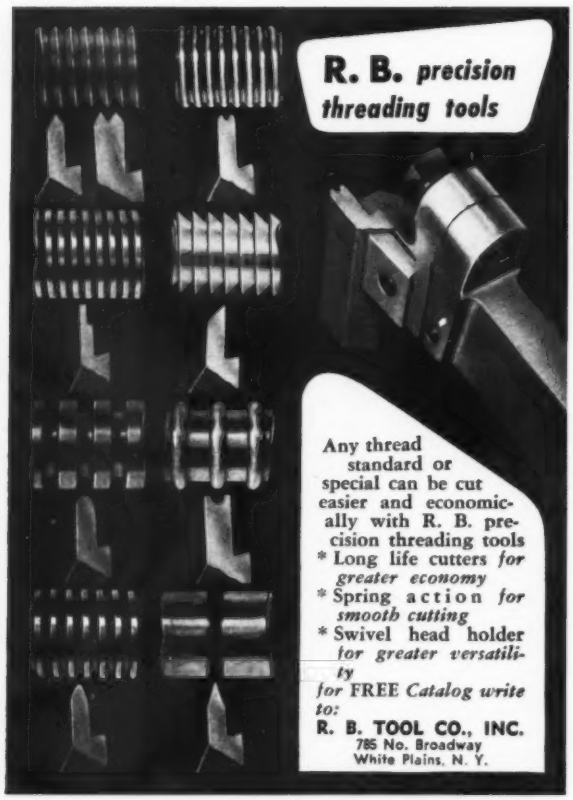
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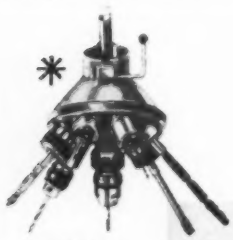
DRILLS *from 2 to 7 holes*

TAPS *from 2 to 7 different sizes in one chucking*



ARBO-2
automatic indexing turret type multi-spindle drill head

JEMCO'S ARBO-2 fits any single spindle vertical drill press

all operations completed with one chucking — no reversing of drill spindle necessary for tapping — speeds changed quickly — reduces machining time-tapping capacity 1/8 to 9/16-drilling capacity 0 to 19/32

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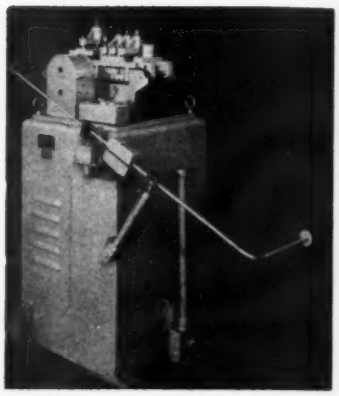
The "Auto-Tap" is a self-contained tapping head unit that operates for a drill press or a direct motor hook-up. A three-way control box permits finger-tip or foot switch control, or remote control set-up for a fully automatic production line. Tap range is 0-80 to ¾-10, up to a 2" stroke. Automatic Methods, Inc., 848 W. Grand St., Elizabeth, N. J., or —
Circle No. A21.



Model PDS-4 Straightener will handle material up to 4½" wide x ⅛" thick. This unit features hinged construction so that it can be opened for easy threading of the end of a new coil. U. S. Tool Co., Inc., Ampere (East Orange), N. J., or —
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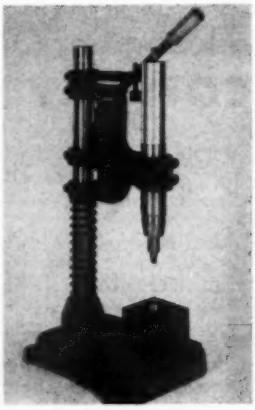

Redesigned for Positive Alignment and maximum length of service is SPB bench series riveter. It has a 7" throat. The riveter can be obtained in three capacity sizes for solid or hollow rivets 1/32" through ¼", based on solid mild steel. It is used for short production runs requiring both hollow and solid rivets to be set without cracking, chipping or flaking. The Lemert Engineering Co., Inc., 201 E. Jefferson St., Plymouth, Ind., or —
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STOPS MIST

COLLECTS MIST-FOG EFFECTIVELY IN A SMALLER SPACE

This efficient Mistkop unit provides low-cost mist control for all machining operations employing coolants or lubricants. Requires no duct work or costly piping—*is actually portable!*

Mistkop is sturdy in design—has a minimum number of parts and gives long, trouble-free service. Stops clouding of lights . . . eliminates fire hazards of uncontrolled mist. Write for detailed description.

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Model 490-B GV METAL WORKER

Use it for:

STRAIGHT CUTTING
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The GV is a universal sheet metal and plate working machine. Its amazing versatility and accuracy have made friends for it in metalworking plants throughout the country. Other models, 155A, 285B and 400B, have cutting capacities up to ⅜ths. You will want complete specifications and literature—so write today!

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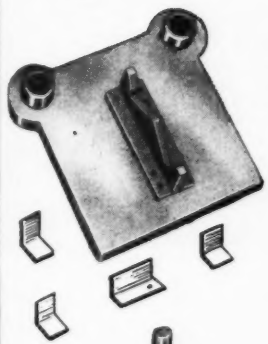
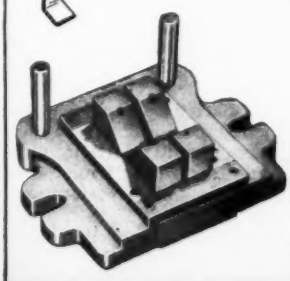
CIRCLE INFORM-A-GRAM KEY NO. 1653

Punches and Dies

Angle Iron Cut Off Die



No. 18, cut off die, for 2"x2"x¼" and lighter angles. Mounted in leader pin die set. Fits 'most all makes of 25-ton and larger presses. Simple shearing action insures straight, clean cut WITHOUT DISTORTION. Another of the many different kinds of punches and dies in stock or made to order for foot, hand or power operation. Also adaptors and die shoes to convert your press. Each precision-made.



Immediate Delivery

What are your punch and die needs? Consult us about your problems. Prompt service on "specials" made to your order.

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WARD Machinery Co. 564 West Washington Chicago 6

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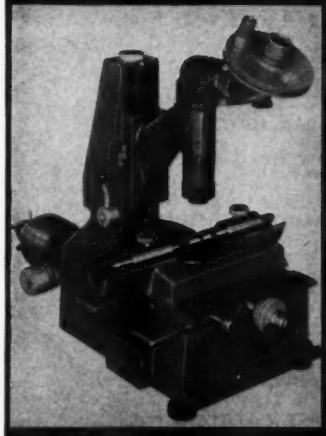

- Permits measurements in 2 dimensions plus checking of Radii, Concentric Circles, threads and angles.
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- Reads to .0001" or to .00005" from Master glass scales in larger models.
- Available in 1" x 2", 1" x 4", 2.3" x 6", 6" x 6" and 8" x 40" capacity.

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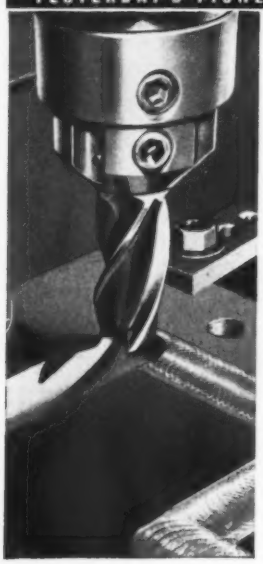

HEAVY DUTY END MILLS and HOLDERS

(Both are Stock Items)

● Look at this rugged 2″ diameter Weldon end mill with 4″ long flutes which made a 2½″ deep cut in a solid block of die steel—4140 steel heat treated to 260 Brinnell. The feed was 1½″ per minute, and the material was removed at a rate of 7½ cubic inches per minute.

This HEAVY DUTY Weldon end mill is held by a new-style end mill holder which bolts securely on to the nose of the milling machine spindle. The holder, located by a centering plug, is driven by two drive keys on the spindle nose. The 2″ diameter shanks of these heavy-duty end mills are securely held by two large hollow head screws.

For top performance and sturdy long life in end mills—large or small—look to Weldon.

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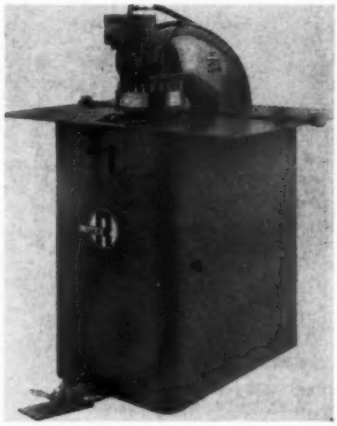
3000 WOODHILL ROAD · · · CLEVELAND 4, OHIO

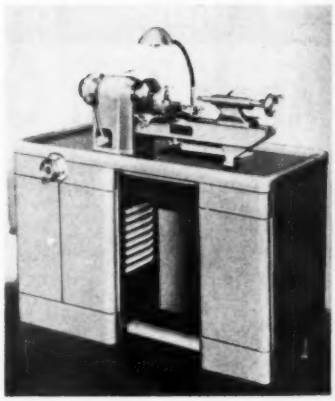
CIRCLE INFORM-A-GRAM KEY NO. 1661

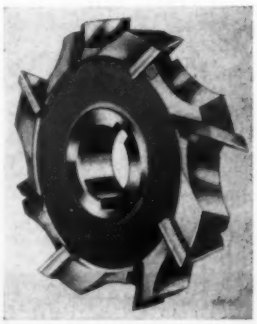
Cut Almost Any Radius in Seconds with Radii II radius cutting machine. It will cut a radius on square, rectangular, flat or round material, ferrous and non-ferrous metals, any size up to 1¼″ thick by 2½″ wide. No set-up time is needed with the machine featuring ease of operation. Special Machinery Co., Inc., 49 Springfield St., Chicopee, Mass., or — **Circle No. A25.**



Capable of Punching a 2″ Hole in 12-gauge mild steel or 14-gauge stainless steel is a power-operated turret punch. Model 18-AH features a newly-designed stand and table equipped with back and side stops. The punch supplies 18 stations ranging from 5/32″ to 2″. Rotex Punch Co., 2350 Alvarado St., San Leandro, Calif., or — **Circle No. A26.**

Turning and General Toolroom Work are handled by Model 73 standard precision lathe. It has a totally enclosed headstock of 1″ collet capacity and a 7″ swing. The variable speed drive gives an infinite range of speeds from 100 to 3500 rpm, in a ratio of 35:1. The Wade Tool Co., Waltham, Mass., or — **Circle No. A27.**



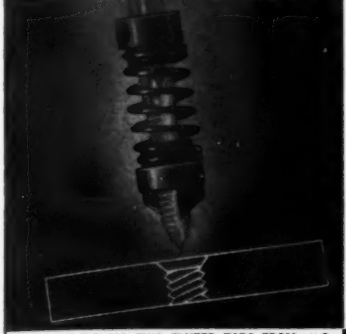


For Use on Aluminum and its alloys and other light metals is a new series of standard flat-faced-blade staggered tooth slotting cutters. Series WAD provides cutters ranging from ⅜″ to 2″ wide and diameters from 4″ to 16″. They provide maximum flexibility. See Bulletin 34 supplied by Goddard & Goddard Co., 12280 Burt Rd., Detroit 23, for details, or—**Circle No. A28.**

ELIMINATE a Complete Operation!

BURR-BIT DE-BURRS TAPPED HOLE WHILE TAPPING

- FAST
- EASY
- PRECISE
- SAVES TIME
- SAVES LABOR
- SAVES MONEY



By merely slipping a BURR-BIT on your tap in a matter of seconds, a complete secondary operation is eliminated. Designed to fit all makes of taps.

- ELIMINATE A SPINDLE
- GET A PERFECTLY CLEAN HOLE
- DE-BURR THIN MATERIAL

CAN BE EFFICIENTLY USED ON PRACTICALLY ALL MATERIALS—STEEL, ALUMINUM, PLASTICS, ETC.

Write for full details—Dept. TPI

MADE TO FIT ALL TWO FLUTED TAPS FROM #2 TO 3/8ths IN ALL PITCHES. AVAILABLE FOR THREE FLUTED TAPS ON SPECIAL ORDER.

BLADES MADE EXTRA LONG TO ENABLE RESHARPENING MANY TIMES.

THE SENSATIONAL BURR-BIT IS A HIGHLY PRECISE PRODUCT MADE OF THE FINEST QUALITY HIGH SPEED STEEL, INDIVIDUALLY INSPECTED.

Dealers Inquiries Invited!

VERNON DEVICES, INC.
481 East 3rd Street,
Mt. Vernon, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1671

"HILLCO" TANGENT CHASERS

A NEW NAME FOR AN OLD ESTABLISHED PRODUCT

In the interests of standardization the line of ACME Tangent Chasers have been modified slightly in dimensions so that they now are adaptable to other makes of die heads in addition to ACME die heads. This complete line of tangent chasers is now known as "HILLCO". "HILLCO" tangent chasers can be reground for 80% of their original length. The same precision and long wear are guaranteed that have made our chasers a standard through 75 years of cutting tool manufacture.

HILL ACME TOOLS FOR INDUSTRY

THE HILL ACME COMPANY
ACME MACHINERY DIVISION
1203 West 65th Street • Cleveland 2, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 1673

WORLD'S HARDEST METAL

● New, improved TALIDE METAL is uniform in quality—gives top performance on ALL cutting, drawing and wear-resistant applications. Write for Catalog 56-G. METAL CARBIDES CORP., Youngstown 12, Ohio.

HOT PRESSED AND SINTERED CARBIDES • VACUUM METALS
HEAVY METAL • CERMETS • HIGH TEMPERATURE ALLOYS
OVER 35 YEARS EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

CIRCLE INFORM-A-GRAM KEY NO. 1672

the NEW SPEEDWAY cut-off tool

- eliminates overhang problems
- increases cutting speeds
- saves in labor, material, power, tool and spindle wear

This new, patented tool provides savings in cutting time, blade replacement and power. The unique construction eliminates the overhang problem by supporting the cutting edge by tension vertically. This permits a much thinner blade in relation to depth of cut. For example, for cuts up to 4¼", the blade is .095" thick. Much less heat is created. Blades and holders are available for cuts up to 4¾". Sharpening is accomplished easily with one or two passes over any tool grinding wheel. The tool is especially stable on interrupted cuts.

Blades available in .0625" and .095"

For complete details, write Dept. TP-1

WYE-STANLEY TOOL CO.
3503 E. OLYMPIC BLVD. LOS ANGELES 23, CALIF.
P. O. BOX 5245 CLEVELAND 1, OHIO

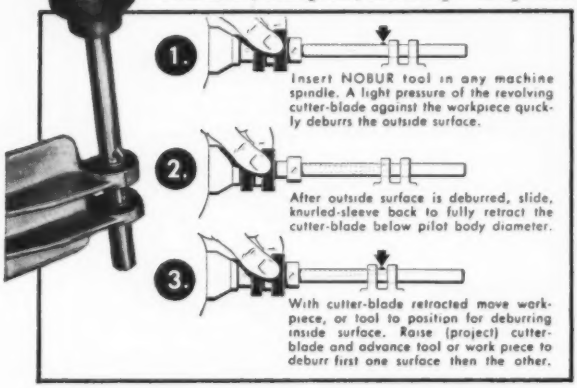
CIRCLE INFORM-A-GRAM KEY NO. 1674

How to... DEBURR THESE INACCESSIBLE HOLE FACES BY MACHINE OPERATION

★ faster
★ better
★ easier

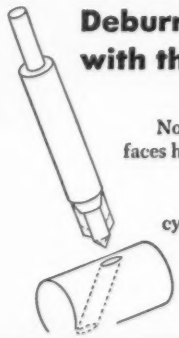
with the amazing
NOBUR TOOL

No more hand-finishing methods for those hard-to-get-at inner surfaces on multi-wall parts. The NOBUR Tool with its double edge cutting blade does the job in seconds . . . all by *machine operation*. Can be used by anyone, with complete safety, on your own lathe, drill press, etc. Simple to operate.


1.
Insert NOBUR tool in any machine spindle. A light pressure of the revolving cutter-blade against the workpiece quickly deburrs the outside surface.
2.
After outside surface is deburred, slide, knurled-sleeve back to fully retract the cutter-blade below pilot body diameter.
3.
With cutter-blade retracted move workpiece, or tool to position for deburring inside surface. Raise (project) cutter-blade and advance tool or work piece to deburr first one surface then the other.

HERE'S ANOTHER PROBLEM SOLVED

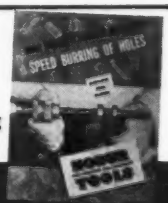
Deburring Elliptical Holes with the *NEW!* ELLIPTI-BURR TOOL



Now . . . deburr openly accessible hole faces having an irregular surface like those developed when holes are drilled angularly or when drilled through cylindrical bodies. This revolutionary tool is self-piloting with a two-lipped cutter that automatically follows the hole surface geometry. Write for full data.

Write for FREE Folder

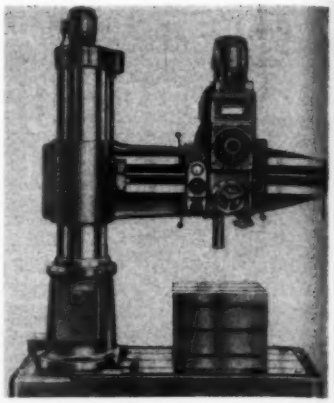
Send for all the details on Nobur Tool Products — the key to *lower* costs, *higher* production and *improved* quality on your deburring operations. WRITE TODAY!



NO BUR TOOLS NOBUR MANUFACTURING CO.
6860 Farmdale Ave., No. Hollywood, California

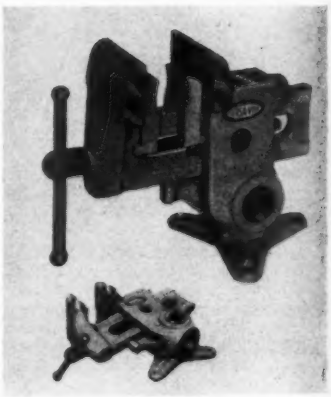
CIRCLE INFORM-A-GRAM KEY NO. 1681

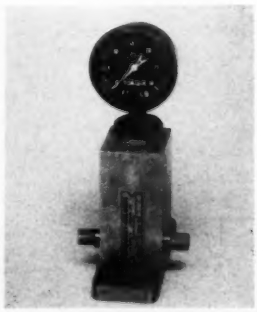
A New Line of Starrett Radial Drills has been introduced by Aaron Machinery Co., Inc., 45 Crosby St., New York 12. Designed for maximum efficiency, they are available in 3', 4', 5' and 6' models. There are 12 spindle speed changes and six mechanical feeds are allowed for every speed on the spindle. **Circle No. A29.**



Model SA 36" Stroke Hy-Draulic Slotter handles with ease large awkward work, irregular sections, internal surfaces, angular and rotary cuts. It is provided with wide range longitudinal and transverse table travel, plus 360° rotary table movement. Rockford Machine Tool Co., Dept. AA, 2500 Kishwaukee St., Rockford, Ill., or — **Circle No. A30.**

A Heavier Version of the Versa-Vise is now available. This vise that turns and locks at any position, has both smooth and removable serrated jaws. It can be set in any working position in a full 360° radius, standing or laid flat, and locked there. The Will-Burt Co., Dept. TP, Orrville, O., or — **Circle No. A31.**





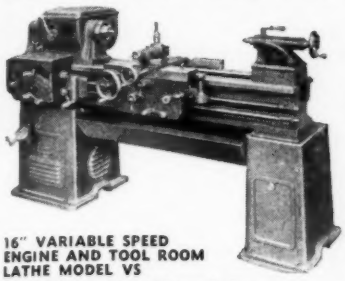
Check and Set All Types of Torque Wrenches with a torque wrench calibrator. It is accurate within 1% of full scale reading, and can be used to check both right and left hand torque wrenches of flat, snap or dial type. Skidmore-Wilhelm Mfg. Co., 442 Green Rd., Cleveland 21, or — **Circle No. A32.**

Over Fifty Years of Lathe Building Experience

2 NEW C&J LATHES AT YOUR SERVICE!

A fitting climax to over half a century of progressive improvement in every detail of designing, engineering and construction. Worth looking into . . . sure to result in

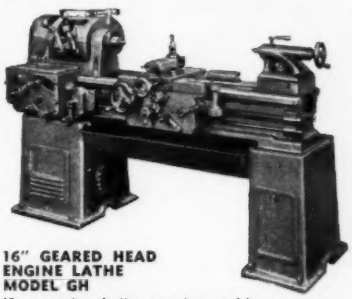
Fast, Accurate Turning at Lowest Costs



16" VARIABLE SPEED ENGINE AND TOOL ROOM LATHE MODEL VS

Standard taper key drive spindle nose. Heavy duty Precision Timken taper bearings on spindle.
Infinitely variable spindle speeds from 30 to 1500 rpm.

WRITE FOR NEW BULLETIN A56VS



16" GEARED HEAD ENGINE LATHE MODEL GH

12 geared spindle speeds provide enormous pulling power. Choice of threaded or taper key drive spindle nose. Heavy duty Precision Timken taper bearings on spindle.

WRITE FOR NEW BULLETIN A56GH

BOTH LATHES ALSO FEATURE:

- Separate rod for feed — lead screw for thread chasing only
- Heavy front and rear cabinet legs for maximum rigidity
- Extra length carriage — 23⅜ in.
- Wide range of threads and feeds — 48 separate threads 3 to 184 range
- Separate longitudinal and crossfeed lever controls employing positive type clutches
- Large crossfeed and compound rest dials

THE CARROLL - JAMIESON MACHINE TOOL CO. BATAVIA, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1691

PAYS FOR ITSELF

Time and Time Again

Wardwell's 57 T, Circular Saw Grinder, will sharpen as many as 250 Milling Cutters, Slitting and Screw Slitting Saws .015" thick at one time with a variation, plus or minus .001" of exact diameter for entire lot. Automatically indexes the gang of saws, one row of teeth at a time. Steady, accurate, durable. Grind either wet or dry. A time and money saver.

Also can be arranged to feed the grinding wheel into the work without attention of the operator.

Ask for Bulletin describing 57 T

WARDWELL MANUFACTURING CO.
3809 Ridge Rd., Cleveland 9, O.

Maker of Largest Line of Saw and Tool Sharpening Machines

CIRCLE INFORM-A-GRAM KEY NO. 1692

Monarch Precision SHAPLANE Radius Tools
Illustration shows convex cutter for ¼" to 2½" balls.

FIVE MODELS for LATHES, SHAPERS, PLANERS, BORING MILLS

Range ½" to 3" for concave Radii. Also heavy duty models for radii to 6" on planers, etc.

PATENT PENDING

Write for circular

C. B. TEETER, TOOL ROOM SPECIALTIES
4470 Oakenwald Ave., Chicago 15, Ill.

CIRCLE INFORM-A-GRAM KEY NO. 1693

SPECIFY TOP QUALITY

DE-STA-CO

ARBOR SPACERS SHIMS and SPACING COLLARS • Arbor Spacers and Shims in 20 sizes and thicknesses from .001" to .125". Arbor Spacers furnished with standard keyway; Shims, with no keyway. Also Spacing Collars in numerous popular diameters, and in thicknesses from ⅛" to 3". Hardened and ground; edges chamfered. Furnished with standard keyway.

FEELER STOCK • Made from tempered stock, rolled to close tolerances, ½" x 25' coils packaged in transparent plastic boxes, except above .020". Strips ½" x 12", in cellophane. 27 thicknesses. All thicknesses from .001" to .032". (For use in precision fitting, checking clearances, inspection and production work.)

SHIM STOCK • Steel or brass. Selected from material rolled to precision limits, free from burrs, and protected by oil coating. Coils packed in carton for easy dispensing and protection. 15 thicknesses, .001" to .032". Sheets 6" x 12"; coils 6" x 120". Available also in two assortment packages —12 thicknesses, .001" to .015", and 15 thicknesses, .001" to .032".

DE-STA-CO

WRITE FOR Illustrated Brochure and Price List!

DETROIT STAMPING CO.
344 MIDLAND AVE. • DETROIT 3, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 1694

INSERTED BLADE GENESEE FACING AND COUNTERBORING TOOLS

Interchangeable Pilots

Constant Chip Space Throughout Life of Blades

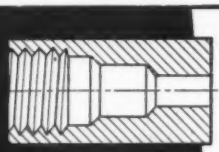
Standard Sizes 1¼ to 4 Standard with Straight or Morse Taper Shanks

H. S. S.—Carbide Tipped Blades. Save 25% or more over cost of Solid Tools

Consult our Engineering Department on your Inserted Blade Production Tool Problems.
WRITE FOR CATALOG 54P

GENESEE MANUFACTURING COMPANY
566 HOLLENBECK ST. • ROCHESTER 21, N. Y.
Adjustable Hollow Mills • Facing and Counterboring Tools • Special Production Tools • Since 1908

CIRCLE INFORM-A-GRAM KEY NO. 1701



DO YOU NEED BORES LIKE THIS ?

Comet's "LOW-COST" HIGH SPEED STEEL STEP DRILL IS THE ANSWER !

Production swings up when step drills are used because . . .

- One tool does more than one operation.
- Greater accuracy is maintained — concentricity being automatic.

Production costs swing down because step drills made to your specifications are only slightly more in cost than a simple twist drill.

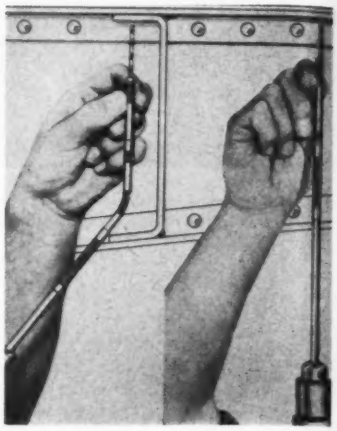
Made to your own specifications PROMPT SERVICE

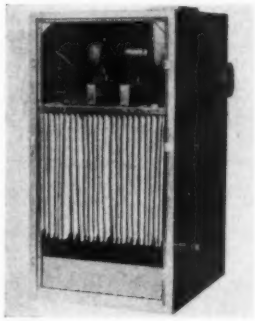
SEND FOR COMPLETE ILLUSTRATED LITERATURE

COMET® TOOL CO.

738-T BROADWAY • NEW YORK 3, N. Y.
CIRCLE INFORM-A-GRAM KEY NO. 1702

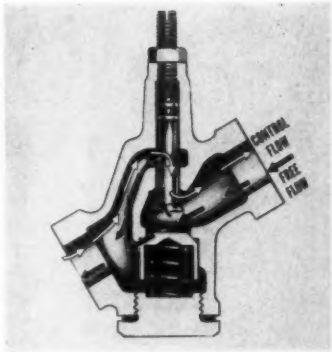
Add 10" or More to Standard Length Drills with the Little Beaver drill extension. No. 600 Series converts the flexible drill extension to a rigid drill extension without shutting off the power by sliding the locking sleeve to either position. It can accommodate over 52 regular drill sizes. Beaver Tool Co., Box 256, Huntington Sta., L. I., N. Y., or —
Circle No. A33.

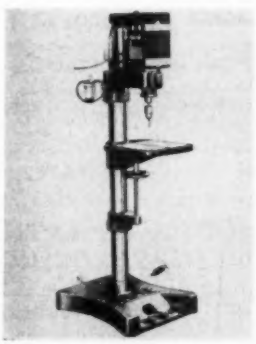




Over 2½ Times More Dust Storage Capacity is a feature of Series 80 cabinet dust collectors. Models 81, 83 and 84 have been redesigned. They are used on jobs producing heavy quantities of dust, chips and shavings. For further details, contact Torit Mfg. Co., Dept. KP, 287 Walnut St., St. Paul 2, Minn., or —
Circle No. A34.

Split-Second Timing of Piston Movement by positive control of air flow is provided by this speed control valve with a screwdriver slot. It can be mounted in any position, at either or both ends of a cylinder for air flow adjustment. Ross Operating Valve Co., 120 E. Goldengate Ave., Detroit 3, or —
Circle No. A35.





Instant Changeover from Drilling to Tapping for long or short production runs is provided by the Drill-N-Tap press. Drill bushings are removed when tapping is desired. The tap fits into the chucks, no extra head is necessary. In addition to standard drills and taps, left-hand ones can be used. The Dumore Co., 1300 - 17th St., Racine, Wis., or —
Circle No. A36.

You Need an Extra Hand Now to Speed Up Production!

HEIMANN TRANSFER SCREW SETS

IN 11 SIZES No. 6 to 1" N.C. In all S. A. E. sizes.

Here is the *faster*, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench —no other tools needed. Get more work *now*—save money too!

HEIMANN MFG., CO. • URBANA, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1711

LEAD HAMMERS—Buy Cook "SHUR-GRIP"

They're a MUST in every shop where many blows have to be struck without marring surfaces. Available with "SHUR-GRIP" drop forged handles.

Write for circular and prices

LAWRENCE H. COOK, INC.

68 MASSASOIT AVENUE, EAST PROVIDENCE 14, R. I.

CIRCLE INFORM-A-GRAM KEY NO. 1712

PRESSURELOK-224

the best diamond wheel ever developed for carbide tool grinding. Guaranteed ultimate cutting life from each diamond particle in every wheel.

UNITED STATES DIAMOND WHEEL CO.

1833 ILLINOIS AVE. AURORA, ILL.

US

IMMEDIATE DELIVERY on all wheel sizes. STRAIGHT, DISH, CUP, FLARE and MOUNTED WHEELS; HONES.

CIRCLE INFORM-A-GRAM KEY NO. 1714

OPERATE HORIZONTAL MILLING MACHINES?

FREE DETAILS illustrate how you can increase horizontal milling machine feeds and speeds up to 200%. Jergens tapered roller bearing bushing replaces present bronze bushing at low cost without machine change. Eliminates bushing wear, cutter breakage, arbor wear, scoring and chatter. Permits use of carbide cutters to full capacity on new or old machines. Write for cost cutting facts today!

DONLEY PRODUCTS, INC.

Dept. TP-1, 11106 AVON AVE., CLEVELAND, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1713

HAND KNOBS

6 SIZES

CAST IRON

Tapped, Reamed or Blank.

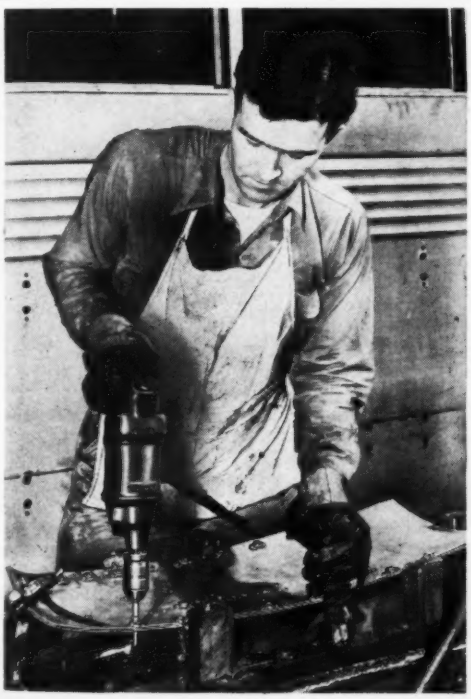
Hex-shaped hub for extra tightening.

Write for catalog

TIETZMANN TOOL CORPORATION

Dept. HK-2 • Englewood, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 1715



LOWER YOUR TOOLING COSTS

use ANCHOR BUSHING® DRILL TEMPLATES

Tooling costs were lowered on school buses through use of inexpensive, lightweight ANCHOR BUSHING drill templates at Superior Coach Corporation, Lima, Ohio.

Photo shows typical application on bus assembly line . . . an ANCHOR BUSHING drill template properly supports the drill to accurately locate and drill rivet holes in a contoured reinforcement cap. The same tooling also locates and drills matching hole patterns on the bus body.

Standard ANCHOR BUSHINGS, in drill ranges of #55 - 7/16", are quickly riveted or spotwelded to .050 sheet metal which can be formed or contoured to any desired shape. Other type ANCHOR BUSHINGS are extensively used in laminate plastic tooling.

STANDARD TYPE FOR SHEET METAL TEMPLATES

CIRCLE TYPE FOR LAMINATE PLASTIC TEMPLATES

U.S. PATENT 2483686 • FOREIGN PATENTS PENDING • TRADEMARK REGISTERED

Ask for free ANCHOR BUSHING Catalog . . . it shows how to make inexpensive sheet metal and laminate plastic drill tooling.

hi-shear RIVET TOOL COMPANY

2600 WEST 247TH STREET • TORRANCE, CALIFORNIA

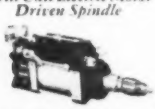
CIRCLE INFORM-A-GRAM KEY NO. 1716

Holomatic SYSTEMS

Double-end machine equipped with two Holomatic drill units. Available in three high-production models.

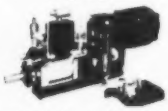
CUT DRILLING-TAPPING TIME

Model 24 – Holomatic Drill Unit Electric Motor Driven Spindle

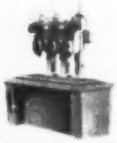


Model 14 – Holomatic Drill Unit Air Motor Driven Spindle

Model 24 – Holomatic Unit For Drilling and Tapping



Model 24 – Holomatic for Deep Hole Drilling



Automatic Drill Press. Available in four base lengths with 1, 2, 3 or 4 Holomatic units vertically mounted.

● The modern high-production method for all automatic spindle type operations. Available as individual, self-contained power head units for installation on existing production machinery or as complete base-mounted machines with automatic controls.

Holomatic units operate on shop air line pressures for thrust and feature a self-contained hydraulic system for positive, accurate spindle travel and feed regulation. Traverse and feed rates are infinitely adjustable. Automatic, manual cycling, skip drilling, stops or dwell operations are easily arranged. Built-in air control valve simplifies set-ups and cuts installation time. Holomatic units operate efficiently at *any* angle.

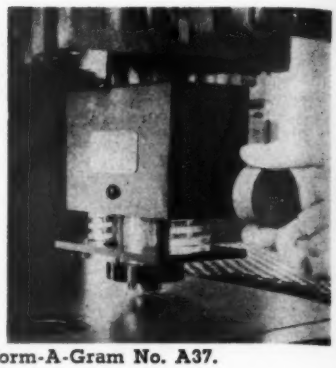
Amazingly versatile, accurate, the Holomatic systems can be quickly and easily set-up for single or multiple operations. A Holomatic system in your plant will quickly and easily pay for itself through savings in time, money and tools.

Survey your production equipment now and visualize how easily and economically a Holomatic unit or complete system could boost your production rates.

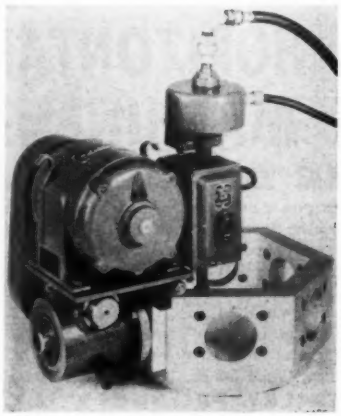
Write today for complete information, specifications and prices ... or, ask your Hause representative for an actual, obligation-free demonstration of the Holomatic System right in your plant!

Hause ENGINEERING
MONTPELIER • • OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1721



Simplify Hole Locating in sheet metal punching when quantities are very small with a new hole locating attachment. Used in standard punch presses, the Lo-Ka-Tor locates and punches holes without the use of stops, gages, pins, etc. Buck Engineering Co., Inc., 37-41 Marcy St., Freehold, N. J., or — **Circle Inform-A-Gram No. A37.**



Designed for Use on Large Turret Lathes are Models 150 and 150B Tru-Hole drilling attachments. They are capable of drilling holes up to 1" and 1¾" respectively. Only one turret station is occupied by the attachment. E. F. Vilter Co., 4161 N. Richards St., Milwaukee 12, or— **Circle No. A38.**

Pressure Adjustment down to 25 psi is a feature of two oil-hydraulic reducing valves now available from Vickers Inc., Box 302, Detroit 32. They provide, for secondary circuits, controlled maximum operating pressure up to 1000 psi. Both are used with ⅜" pipe size in systems having operating pressures up to 2000 psi. **Circle No. A39.**

An Automatic Feeder for thread rolling machines handles eye bolts, set screws and headless or non-symmetrical parts. The feeder is synchronized with the roll thread machine and operates in its speed range up through 75 pcs/min. The machine illustrated is tooled to handle five different eye bolt sizes. Automation Develoment Corp., 38845 Mentor Ave., Willoughby, O., or **Circle No. A40.**

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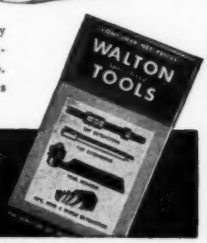

The WALTON Company
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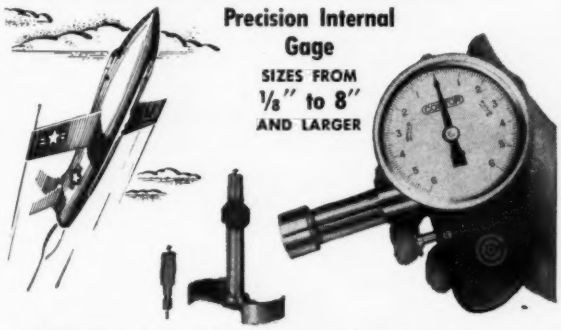
The Jet Engine Program relies heavily upon this gage for critical bores.



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SIZES FROM 1/8" to 8" AND LARGER

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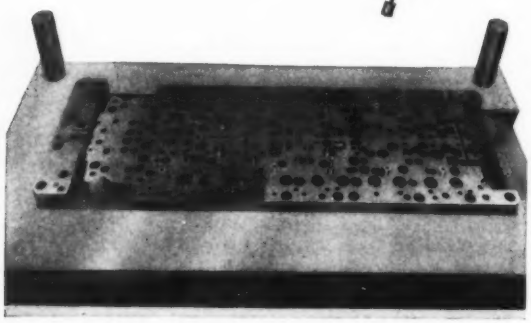

A seven station die from Vulcan's contract Tool Room (Your Tool Room in Dayton).

Standard sized punches and buttons were used. But since forming and piercing operations were involved, hardening of the sections was necessary followed by JIG GRINDING. Result: Close tolerances held easily and perfect progression throughout — another satisfied customer.

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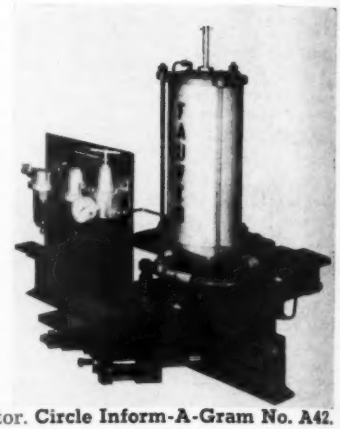
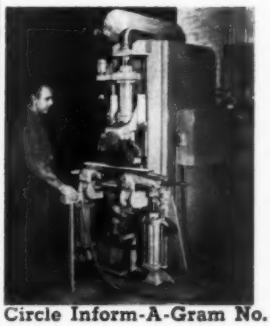


An Improved 700 Series of Conveyor Lubricators has been announced by J. N. Fauver Co., Inc., 51 W. Hancock, Detroit 1. There are two types — Model 702 which lubricates one side of the conveyor only and Model 704 which lubricates both sides of a mono-rail conveyor. They feature universal pick-up and improved air control panel, filter, regulator and lubricator. **Circle Inform-A-Gram No. A42.**



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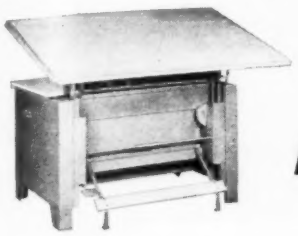

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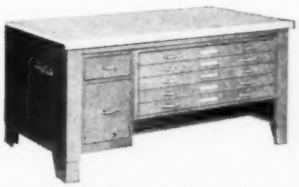

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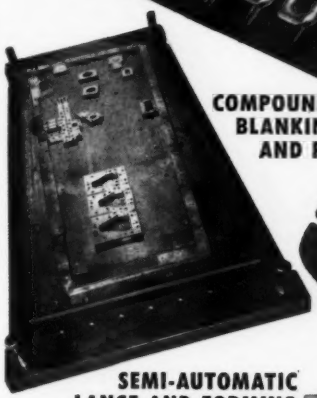
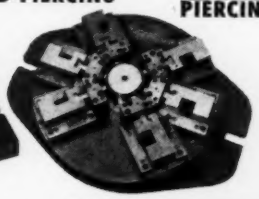
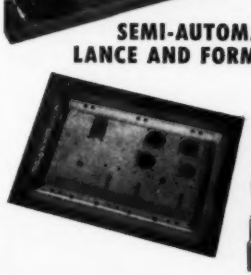


COMPOUND BLANKING AND PIERCING



CAM PIERCING



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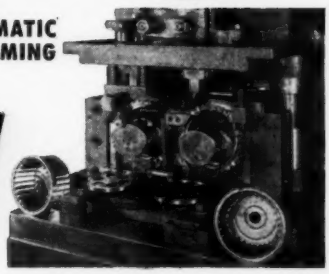

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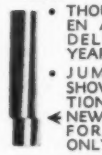

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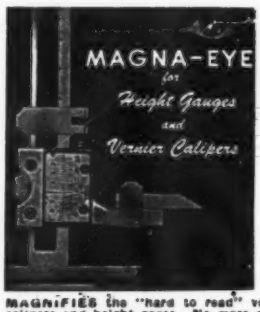

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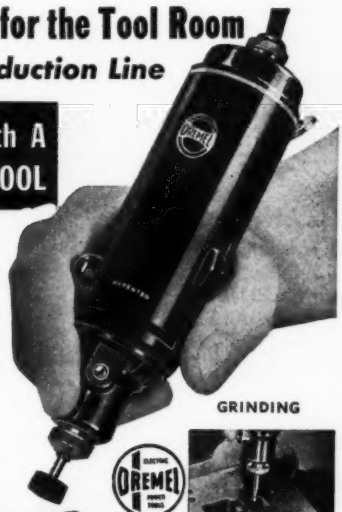

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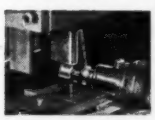

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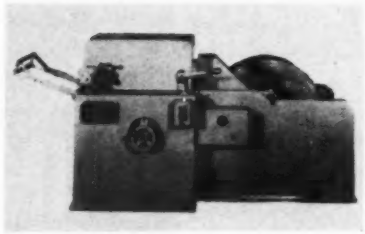

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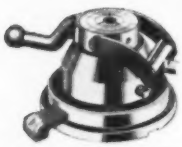
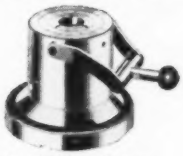


Collet indexing fixture



Collet holding fixture

Vertical-horizontal collet fixture

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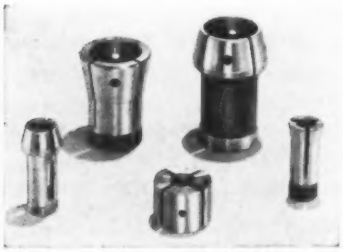

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CIRCLE INFORM-A-GRAM KEY NO. 178

Grind Lapping Pins or Special Parts up to a 90° included angle with a low-cost precision pin grinder. For additional information on Model WE grinder, contact Dykrex-Roos Corp., P.O. Box 9022, Northeast Sta., Newark 4, N. J., or — **Circle Inform-A-Gram No. A51.**

A New Line of highly accurate automatic counting devices is used with any operation controlled by pneumatic or hydraulic action. The counter screws into the line controlling any air or hydraulic cylinder

and can be completely installed in 5 min. Models are available for from 1 to 5000 lbs and up to 300 counts/min. Pneumaticount, 3400 N. E. 54th Ave., Portland, Ore., or — **Circle Inform-A-Gram No. A52.**

Regular Setting and Checking of All Types of Valves from ¼" screwed to 4" flanged, is handled by a packaged valve test stand. Models are available for any ranges up to 10,000 lbs. A complete description and all specifications are contained in Bulletin 545 released by Industrial Engineering Corp., 525 E. Woodbine, Louisville 8, Ky., or — **Circle Inform-A-Gram No. A53.**

Drill Hardened Steels without Annealing—

USE The New IMPROVED "HARDSTEEL" DRILL

With the new, improved "HARDSTEEL" Drill, you can do accurate, smooth drilling, countersinking, counterboring and reaming in steels hardened by any process without first annealing the work. And they work with equal ease on work-hardening steels and high carbon—high chrome steels of any degree of hardness.

"HARDSTEEL" Drills fit standard drill presses. They save time and reduce rejects. They permit engineering changes requiring additional drilling after hardening. And parts drilled after hardening always match at assembly.

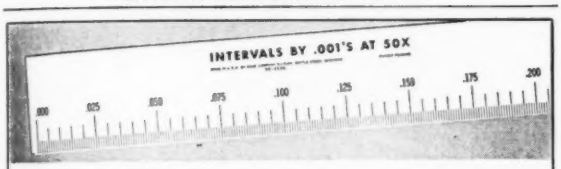
Write for a copy of the "HARDSTEEL" Operators Manual showing how "HARDSTEEL" drills are cutting costs in thousands of plants.

You Harden It—We'll Drill It— With "HARDSTEEL"

BLACK DRILL COMPANY, INC.
1368 East 222nd St. • Cleveland 17, Ohio

"HARDSTEEL"

CIRCLE INFORM-A-GRAM KEY NO. 1791



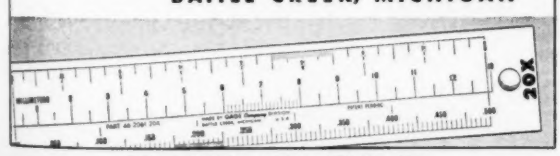
Gage Company PRECISION PLASTIC
COMPARATOR SCALES

Non-breakable...accurate...designed for making quick measurements at scale on projectors and comparators without any movement of machine or work.

An unexcelled tool for use in drafting and constructing scale layouts for comparator chart use. All standard magnifications and various styles for every application.

WRITE FOR BULLETIN NO. 54-1511

GAGE COMPANY
BATTLE CREEK, MICHIGAN



CIRCLE INFORM-A-GRAM KEY NO. 1792

ACCURACY .0002 T.I.R.

.0002 T.I.R. OR LESS AT SPINDLE NOSE, .0005 T.I.R. OR LESS ON TEST ARBOR SIX INCHES FROM SPINDLE NOSE

SPINDLE SPEEDS 150 and 250 RPM Other Spindle Speed Pulleys Available

MODEL B943 MOTOR DRIVEN WORK HEAD

No. 11 B & S Tapered Spindle Standard Equipment. No. 12 B & S or No. 5 Morse Available at Slight Extra Cost. Same Accuracy Guaranteed!

The B943 Motor Driven Work Head is a compact self-contained power unit for internal and external grinding. It is held in position by two T-slot bolts and can be mounted at any convenient spot on the table. The swivel base, which is graduated 90° one side of center and 45° on the other, permits the Work Head to swivel full 360° if desired. Swivel base can be easily removed from head permitting units to be mounted on table without base if desired. The B943 is easily and quickly mounted on other makes of grinders.

The No. 11 B & S tapered spindle, mounted on ball bearings, is hardened and ground, and is designed to receive chucks, collet fixtures, face plates, straight or tapered sleeves, centers and like equipment. Unit is grease packed at factory and requires no service in the field for the life of the bearings. Streamlined in design, this fixture is quickly mounted and is easy for the operator to keep clean.

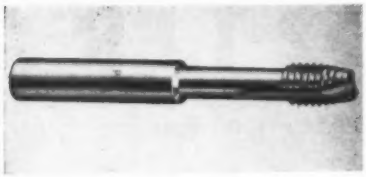
The special motor is provided with conveniently located reversing switch which is handy for the operator regardless of the position of the work table or rotation of the work. Motor operates quietly and is fully protected from dust and from any oil entering from working parts.

See this extremely accurate B943 work head at your equipment dealer or write for complete literature.

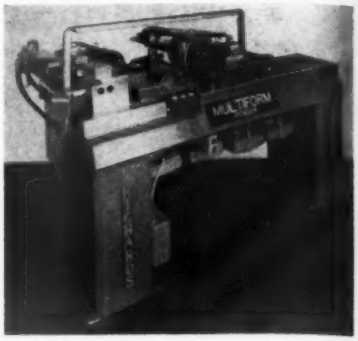
K. O. LEE COMPANY
ABERDEEN, SOUTH DAKOTA

CIRCLE INFORM-A-GRAM KEY NO. 1793

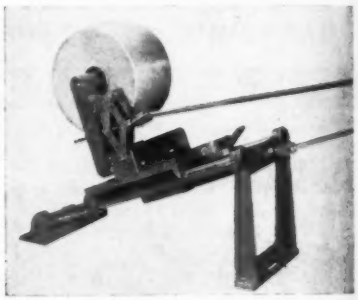
Designed Specifically for Use in Screw Machines is this new Stub Tap. It features a necked shank for generous lubrication, and a spiral point to reduce torque and improve chip disposal. Its shorter thread length counteracts the tendency to produce bellmouth threaded holes because of misalignment. The Stub Tap is available from stock in high speed steel ground thread, NC or NF, plug or bottoming chamfer, in Nos. 2 to 10 machine screw sizes, to GH2 limits. Pratt & Whitney Co., Inc., W. Hartford, Conn., or —
Circle Inform-A-Gram No. A54.



Produce Multi-Angled Channels in widths from 2' to 6' with the Multiform double end bender. This hydraulic machine has a 15-sec automatic production cycle and push button controls. It can be equipped for double end bending of any kind or shape of material. J. A. Richards Co., 903-05-07 N. Pitcher St., Kalamazoo, Mich., or —
Circle Inform-A-Gram No. A55.



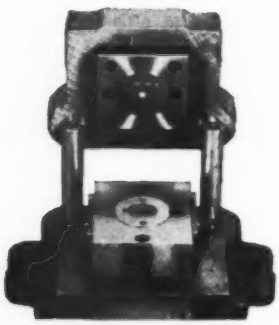
Maximum Operating Convenience and Flexibility are provided by a backstand idler announced by Fenlind Engineering Co., 5602 Pike Rd., Loves Park, Ill. Model L-610 is adaptable to any application, from precision work with narrow belts to the heaviest roughing operations. It is designed specifically as a belt idler for grinding and polishing lathes.
Circle Inform-A-Gram No. A56.



A Hi-Spiral Combination Center Drill has been produced by Circular Tool Co., Inc., Providence. R. I. It is designed for maximum ease in clearing chips in order to produce superior finish and performance. The drill is made in both regular and arbor types which are available in standard diameters and lengths.
Circle Inform-A-Gram No. A57.

"HOVIS WASHER DIES have sure solved our troubles!

"You, too, should make washers the economical Hovis way. Save time, labor, materials and storage space"



Made in 5 sizes:
¾"- 1½"- 2½"- 4"- 6"
Write for Literature

NO NEED TO MAKE A NEW DIE FOR EVERY STAMPED PART

The modern method adopted by manufacturers nationally . . . These *Patented* Dies provide a Master Holder by which, upon simply and quickly removing and replacing Five, Small Interchangeable Parts, a new size washer may be produced . . . Special sets of parts available for use in these units . . . This method makes possible production of irregularly shaped pieces and shallow draws . . . Multi-Washer Dies designed and manufactured.

HOVIS SCREWLOCK COMPANY

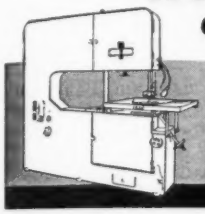
8100 E. NINE MILE ROAD VAN DYKE, MICHIGAN
Phone: Slocum 7-4800 Suburb of Detroit
CIRCLE INFORM-A-GRAM KEY NO. 180

FRICTION SAWING with Tannewitz HIGH SPEED BAND SAWS

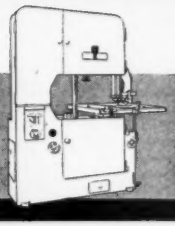
FASTEST, BEST MEANS OF CUTTING METALS

If you are not familiar with the advantages of friction sawing with these machines, by all means drop us a line asking for "Friction Sawing Data." You can save many times the cost of a Tannewitz High Speed Band Saw and greatly expedite production by using it to cut sheets of both hard and soft steel, formed or flat, trimming malleable and steel castings, cutting armor plate or many other materials. Write NOW!

THE TANNEWITZ WORKS
GRAND RAPIDS, MICHIGAN ☎ GL-6-1729



TANNEWITZ DI-SAWS — 24", 36", 48", 60" CAPACITIES
for CONTOUR SAWING, FILING, POLISHING
The smoothest, fastest, most trouble-free DI-Saws on the market. Write for bulletin.



CIRCLE INFORM-A-GRAM KEY NO. 1811

ONLY

THRIFTMASTER *Universal Joint Type* DRILL HEADS

have these exclusive* features

6 Standard Models

Models U-608 and U-1000—Ball Bearing.

Models U-620B and U-1012B—Plain Bearing. 11/16" or ½" min. centers.

Models U-608-BS and U-1000-BS—Ball Bearing Gear Case. Plain Spindles.

Semi-Standard Heavy Duty Full Ball Bearing

½" in Cast Iron—1-7/16" min. centers 7⅛" or 9¾" Dia.

½" in Steel—1-13/16" min. centers 7" or 9⅝" Dia.

Also larger Adaptations and Full Line of Fixed Center Drill Heads.

• Standard Full Ball Bearing Construction including Spindles Driving assembly is FULL BALL BEARING mounted with 3 Bearings on each spindle. Thrust load carried by radial thrust bearings.

• Standard Slip-On and Slip-Off Template Construction for accurate setting and locating spindle brackets are machined to receive slip-on and slip-off template.

WRITE FOR FULL INFORMATION

THRIFTMASTER *Products Corporation*
A SUBSIDIARY OF THOMSON INDUSTRIES, INC.

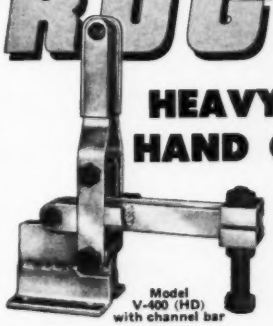
Also Makers of DORMAN AUTOMATIC REVERSE TAPPERS

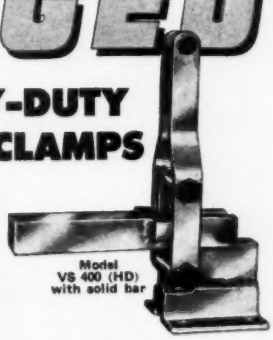
1012 N. Plum Street
Lancaster, Penna.

CIRCLE INFORM-A-GRAM KEY NO. 1812

RUGGED

HEAVY-DUTY HAND CLAMPS





Knu-Vise offers rugged heavy-duty clamps, with solid bar or channel bar, and either hand or air operated, for all kinds of tough holding jobs.

In addition to their stand-up stamina for rough going, these Knu-Vise Clamps feature:

1—Easy and complete replaceability of parts
2—Hardened and ground bearing bolts
3—Minute adjustment of parts through self-locking nuts
4—Toggle Bars from C.R.S. Bars

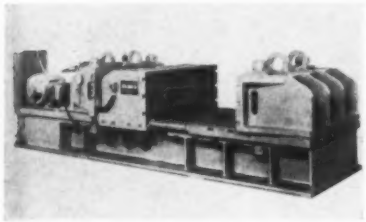
Developments like these are typical of Lapeer engineering. More information? Write for catalog today on the models available.

Manufacturers of over 150 models of manually and air-operated clamps and pliers

KNU-VISE PRODUCTS LAPEER MANUFACTURING CO.
3064 DAVISON ROAD • LAPEER, MICHIGAN
WESTERN DIVISION: 422 Magnolia, Glendale, California • CANADIAN DIVISION: Higginson Engr., Hamilton, Ontario

CIRCLE INFORM-A-GRAM KEY NO. 1813

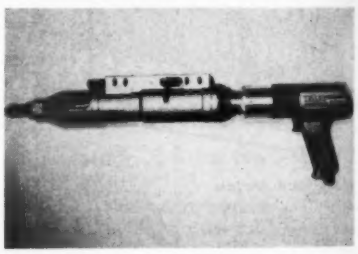
Unusually Heavy Bending Operations are speeded up by a 200-ton hydraulic bulldozer. The Elmes unit is exceptionally large in size and extra rugged in construction. The opening is adjustable from 60" maximum to 12" minimum. American Steel Foundries, Elmes Engineering Div'n, 1150-Y Tennessee Ave., Cincinnati 29, or **Circle Inform-A-Gram No. A58.**



Install 6000 Terminals/Hr with an automatic termination machine. The Termatic automatically connects wire sizes 22 through 12 to a quick-disconnect terminal, the Fingrip. Insertion of the wire actuates the Termatic, eliminating rejects and minimizing operator fatigue. Burndy Engineering Co., Inc., Omaton Div'n, Norwalk, Conn., or — **Circle Inform-A-Gram No. A59.**

A Boring Tool Resharpening Fixture has been added to the line of precision tools and tool accessories produced by Bokum Tool Co., Inc., 14775 Wildemere Ave., Detroit 38. This fixture was developed for resharpening boring tools of Bokum design only, Styles A and B. It provides a fast, accurate means of maintaining tool efficiency, prolonging tool life. **Circle Inform-A-Gram No. A60.**

Drill Up To ⅜" Holes in Hard Materials with a portable air-powered drill with positive mechanical feed attachment. The Keller K-Matic drill develops up to 1000 lb of thrust. It is used for drilling aluminum alloys, titanium or heat-treated stainless and alloy steels. Keller Tool Div'n, Gardner-Denver Co., Grand Haven, Mich., or — **Circle Inform-A-Gram No. A61.**

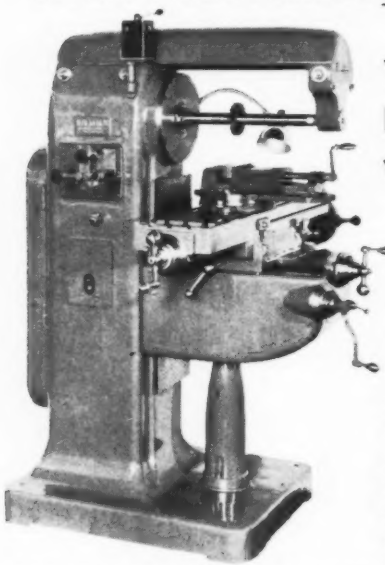


An Improved Portable Abrasive Belt Unit has been announced by Grinding & Polishing Machinery Corp., 2530 Winthrop Ave., Indianapolis 5. The tool design of Model 3-36 permits grinding on contact wheel, on the platen or slack of belt for convex surfaces. This tool will develop a speed of 4700 sfpm and is ideal for occasional jobs as well as for production work. **Circle Inform-A-Gram No. A62.**

WORLD WIDE *Acceptance*

INDEX

YOUR ASSURANCE OF TOP VALUE!



You Get Peak Performance with an INDEX Model "60" HORIZONTAL MILL

• Simple, efficient, compact, with all operating parts enclosed, yet readily accessible. Unusually low-priced. Designed for the average tool room, yet highly suitable for production shops through its rigidity and low maintenance cost. Standard table 40" x 9", larger table optional.

The INDEX LINE also includes the Famous "SUPER 55" and the Popular "45" Vertical Mills

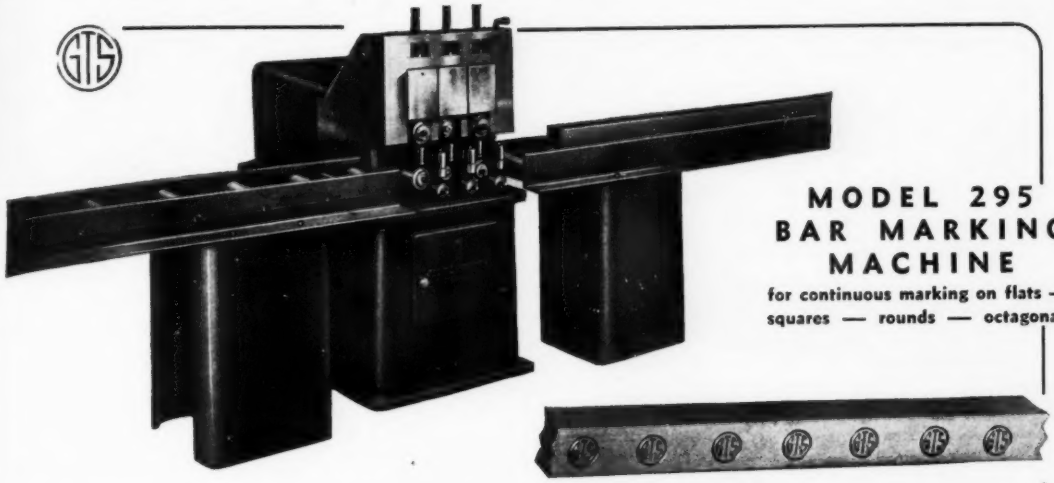
Write for Literature

INDEX MACHINE CO.

541 N. MECHANIC STREET JACKSON, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 182

Precision . . . Speed . . . Versatility



MODEL 295 BAR MARKING MACHINE

for continuous marking on flats — squares — rounds — octagonals

Simple horizontal and vertical adjustments on this unit fix the work for precision operation. Bars may be marked on one side only or on opposite faces. Intermittent marking is obtainable at desired intervals up to 9 in. Lettering knurls can be quickly changed by removing a single screw. Feed and discharge roller bearing tables are available with the unit.
Write today for full information on Model 295, or any part of the famous GTS line of marking equipment.

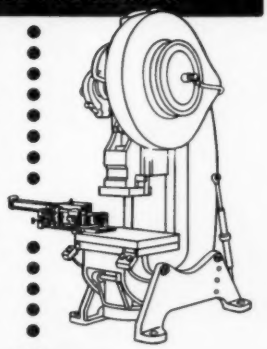
GEO. T. SCHMIDT, INC.
4112 Ravenswood Avenue
Chicago 13, Illinois

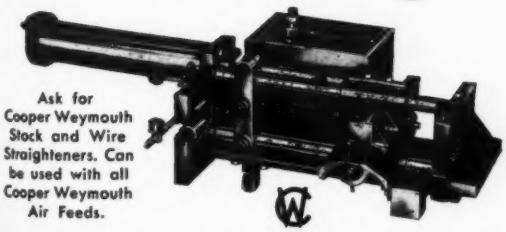
If it's Worth Making, It's Worth Marking.

CIRCLE INFORM-A-GRAM KEY NO. 1831

COOPER WEYMOUTH
AIR OPERATED SLIDE FEEDS
Boost Power Press Production

Specifically designed to solve the automatic feeding problems in press rooms. Simplified, open throat construction. Air operated from standard shop lines. Easily set up and adjusted at the front, rear or sides of press for accurate long or short runs. Cooper Weymouth Air Feeds, made in five sizes, will feed lengths up to 36", of stock up to 18" in width. They are readily adaptable to material of irregular cross section and ideal for use with hydraulic presses.





Ask for Cooper Weymouth Stock and Wire Straighteners. Can be used with all Cooper Weymouth Air Feeds.

SEND FOR INFORMATION ON THESE AND OTHER PRODUCTS

COOPER WEYMOUTH, INC.
600 HONEYSPOT ROAD, STRATFORD, CONN.

CIRCLE INFORM-A-GRAM KEY NO. 1832

LAYOUT FLUID
IDEAL FOR METAL PATTERN MAKERS

TRIAL OFFER

Send me my order of D-R LAYOUT FLUID right away! Bill me ☐ Bill my company ☐
Name_____
Company Name_____
Address_____
City_____ Zone_____ State_____

2 FOUR OZ. "BRUSH-IN-CAP" CANS
$1.00

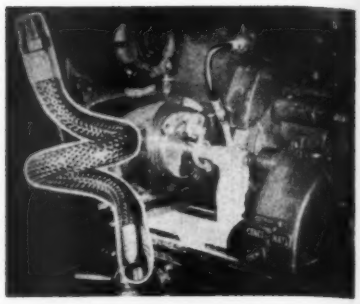
DAYTON ROGERS
Manufacturing Company
MINNEAPOLIS 7B, MINNESOTA

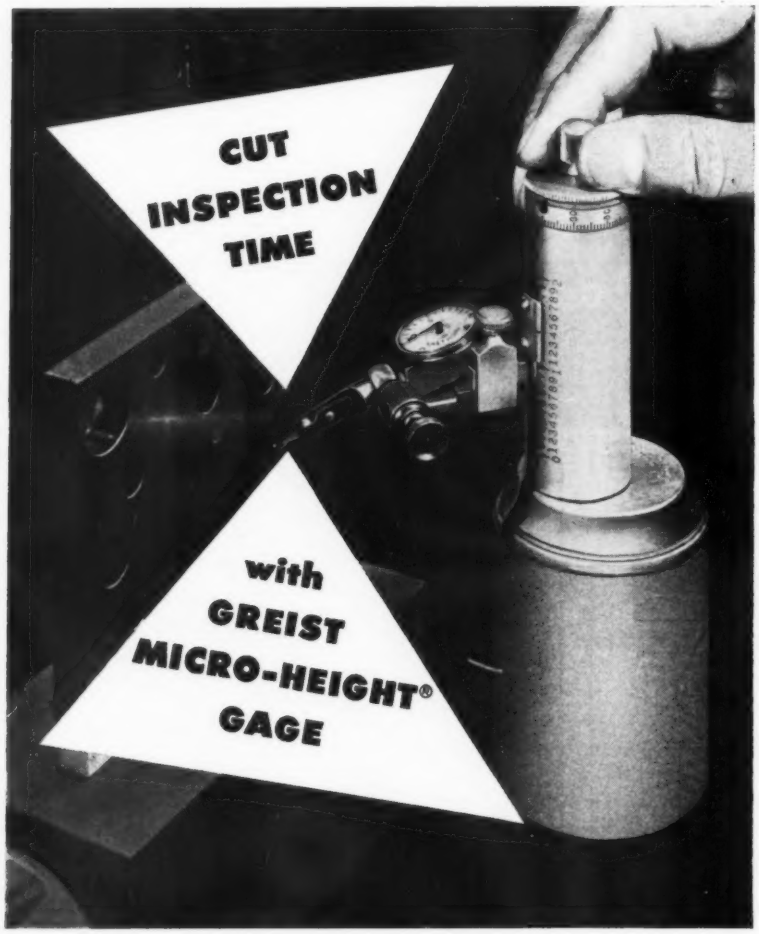
CIRCLE INFORM-A-GRAM KEY NO. 1833

For High-Speed Precision Grinding and Finishing of O.D., use an automatic rotary abrasive belt grinder introduced by Engelberg Huller Co., 881 W. Fayette St., Syracuse 4, N. Y. It will handle circular parts from 26" to 40" dia and can be modified for other diameter ranges. The wet-or-dry belt grinder is used for grinding ferrous and non-ferrous metals, plastics, etc. Standard belt size is 8" x 107", with belt speeds available from 2000 to 5000 sfpm, depending on application.
Circle Inform-A-Gram No. A63.

Eliminate Splash and Coolant Throw-Off with a new coolant assembly. The Kling-Flo assembly features a plastic coolant hose with a one-piece aerator nozzle, that can be twisted and turned into any bend and stay in that position. Any combination of assembly lengths, fittings, and accessories are available, allowing the Kling-Flo to be used on any metalworking machine. Cobon Plastics Corp., 44 Lafayette St., Newark 2, N. J., or —

Circle Inform-A-Gram No. A64.





Precision-built Micro-Height reads **faster than your micrometer!** It measures height direct from **zero at base** to 3". Hundredths on barrel ...thousandths on large head that **cuts reading time!** Attach your dial indicator for quick measuring between holes, surfaces!

CUT LAYOUT TIME! Micro-Height also scribes like your vernier height gage. Riser extends range to 9". Precision-built, satin-chrome finished Micro-Height Gage quickly pays for itself!

Call your distributor or write

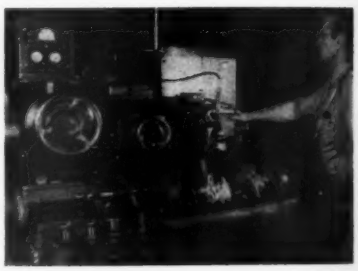
THE **GREIST** MANUFACTURING COMPANY, 481 BLAKE STREET, NEW HAVEN 15, CONN.

Precision Products since 1871

CIRCLE INFORM-A-GRAM KEY NO. 184

Designed for Installations Where Space Is at a Premium are the manifold mount control valves announced by Versa Products Co., Inc., 249 Scholes St., Brooklyn, N. Y. They are available in 2-, 3-, 4- and 5-way types in sizes from ⅛" to 1" NPT. These easy-to-install valves are ideal for applications where speed of removal and reinstallation are required to insure uninterrupted production.
Circle Inform-A-Gram No. A65.

Standard Units for Automatic Machine Tool Control are now available from Airborne Instruments Laboratory, Inc., 160 Old Country Rd., Mineola, N. Y. Microtrol equipment performs gaging of manufactured



products and feed-back control of the process machinery. Each unit performs one specific function and is completely self-sufficient except for the electric connections. Shown is the equipment used in connection with automobile crankshaft grinding.
Circle Inform-A-Gram No. A66.

A 0.0002" Accuracy is a feature of a large model radius dresser. The Giant radius dresser quickly shapes and dresses large diameter grinding wheels either concave, convex or a combination of both. It will also perform the same dressing operations on small bench surface grinders, and is adaptable for use on cylindrical grinders. Somerset Tool Co., Virginia St., Hillside, N. J., or —
Circle Inform-A-Gram No. A67.

You Can Rely on a **ROUSSELLE**

THESE 40-TON PRESSES take job after job in stride and give you top speed and uniform output on a variety of work. They stress simplicity in every detail to achieve quicker set-ups, easier changeovers and simpler operation. All are extra rugged, high precision units, made to withstand hard usage and assure long, satisfactory service. They are *very moderately priced.*

Manufacturers of Rousselle Presses

Significant savings may result if you let our engineering staff assist you. There is no obligation.

●

Rousselle Presses are sold exclusively through leading machinery dealers.

●

Choice of 25 models in 5 to 40-ton sizes.

SERVICE MACHINE CO. 2310 West 78th Street • Chicago 20, Ill.

CIRCLE INFORM-A-GRAM KEY NO. 1851

LIFTING DEVICES

for

FAST • SAFE • BETTER Material Handling of

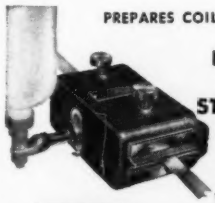
• SHEETS
• COILS • BOXES
• MOLDS
• DRUMS • PALLETS

400 MODELS

Prompt Delivery
Write for full particulars

H. L. BUSHMAN CO. 100 West Central Ave. Roselle, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1852



PREPARES COIL STOCK FOR PRESS

New Low Cost

LIGHT-DUTY OILER-STRAIGHTENER

$95.00

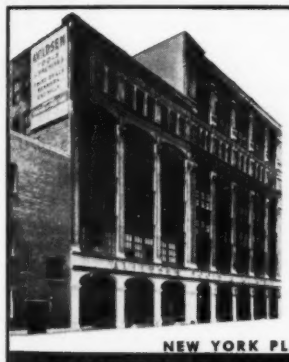
Handles stock up to 3" wide, 1/16" (app.) thick

Write for details

JACO DEVICES, INC.

96 High St., Hingham, Mass.

CIRCLE INFORM-A-GRAM KEY NO. 1853



REPUBLIC

TWIST DRILLS — REAMERS

Whether it is for No. 40 holes in Titanium sheets for Jets or 13/16" holes in thick armor plate, Republic Drills give more holes per drill and more holes per hour of direct labor.

REPUBLIC DRILL & TOOL CO.

DIVISION OF AVILDSEN TOOLS & MACHINES, INC.

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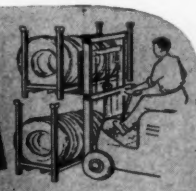

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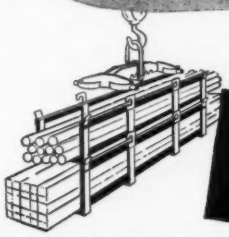

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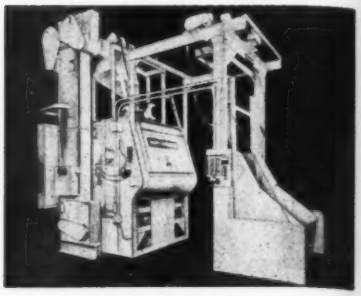
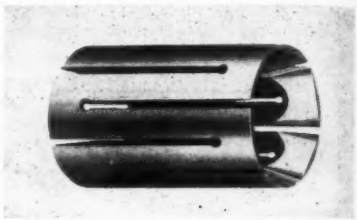


The Tork-Lok Collet Arbor is now available in sizes to 6¼". Four additional arbors in between centers, flange-mounted draw bar and air-operated styles are being manufac-



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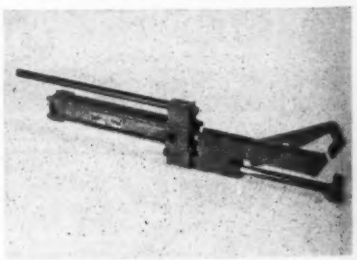

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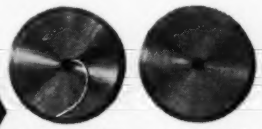

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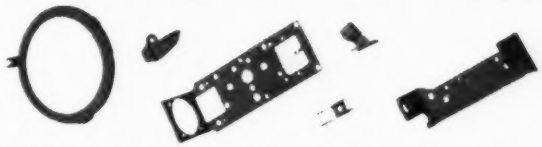

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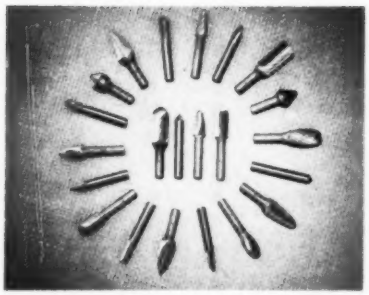

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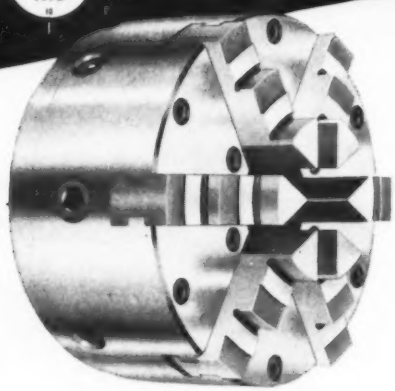

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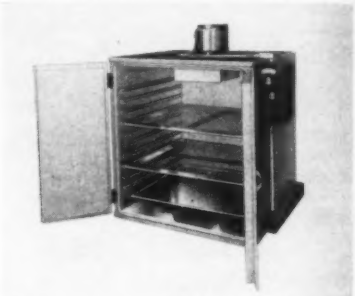

els, lacquer, wrinkles or other finishes, drying parts after cleaning, preheating molds, etc. Grieve-Hendry Co., Inc., 1401-17 W. Carroll Ave., Chicago 7, or —
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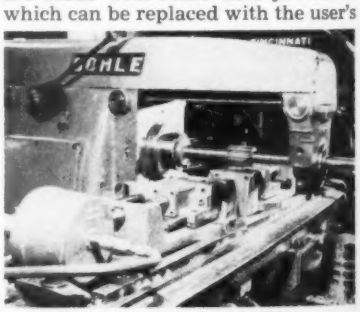

own jaw inserts for holding any round, rectangular or angled workpiece. The vise bolts to any standard machine so that one unit can be used for milling, drilling, broaching, etc. Wilton Tool Mfg. Co., Inc., Schiller Park, Ill., or —
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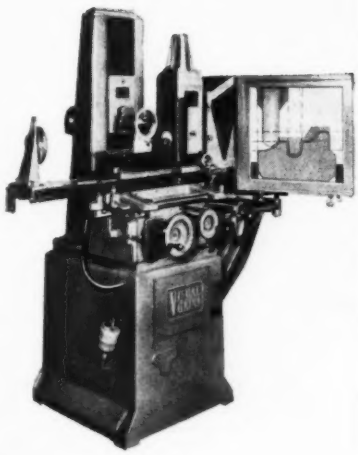

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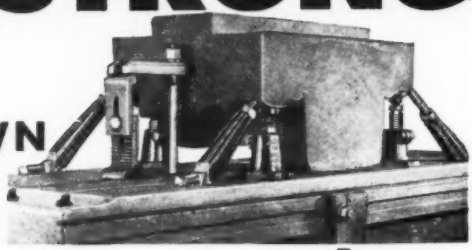

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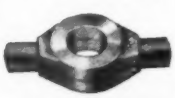

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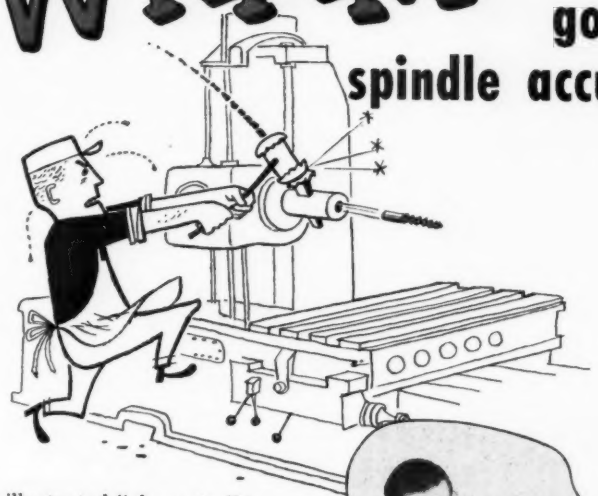
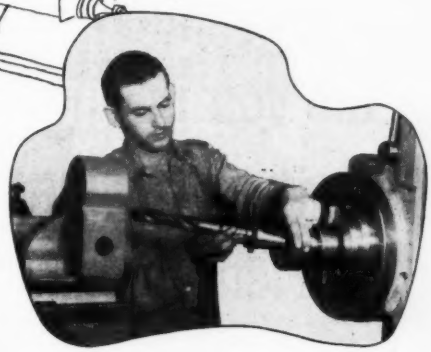
Zagar Tool, Inc. 178

WHAM and there goes spindle accuracy



Our illustrated "character" is about to ruin spindle accuracy with a hammer and drift key that cost a lot of money to get in the first place. Modern P.D.Q. tooling can eliminate this abuse . . and save time and money as well. A quick one-sixth turn of the holder nut releases the adapter and you're ready for the next operation . . . it's as easy as that. How about those machine tools in *your* plant? Get the facts on P.D.Q. tooling . . . Write fc complete information.



Representatives in principal cities.

PDQ **PORTAGE Double-Quick, Inc.**

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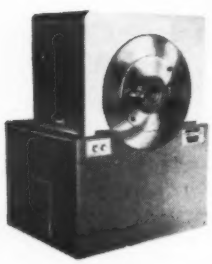
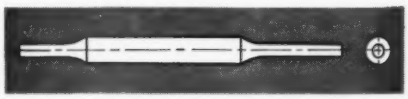
CIRCLE INFORM-A-GRAM KEY NO. 191

How much are you paying for the machine that isn't there?



Because a Torrington Rotary Swaging Machine shapes work by reduction instead of cutting metal away, many parts you are now machining can be *swaged* in less time, using less material.

Take this steel shaft, originally produced by turning. By using a smaller blank and *swaging* both ends (in 9 seconds), a 37% material saving was realized. Accuracy to ±.001" was secured with unskilled labor!



You can put many operations on a Torrington Swager—pointing, tapering, reducing, sizing, forming inside contours and threads. In a short time, your swaging machine will have paid for itself. If you operate screw machines you cannot afford to be without a Torrington Rotary Swaging Machine.

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CIRCLE INFORM-A-GRAM KEY NO. 192

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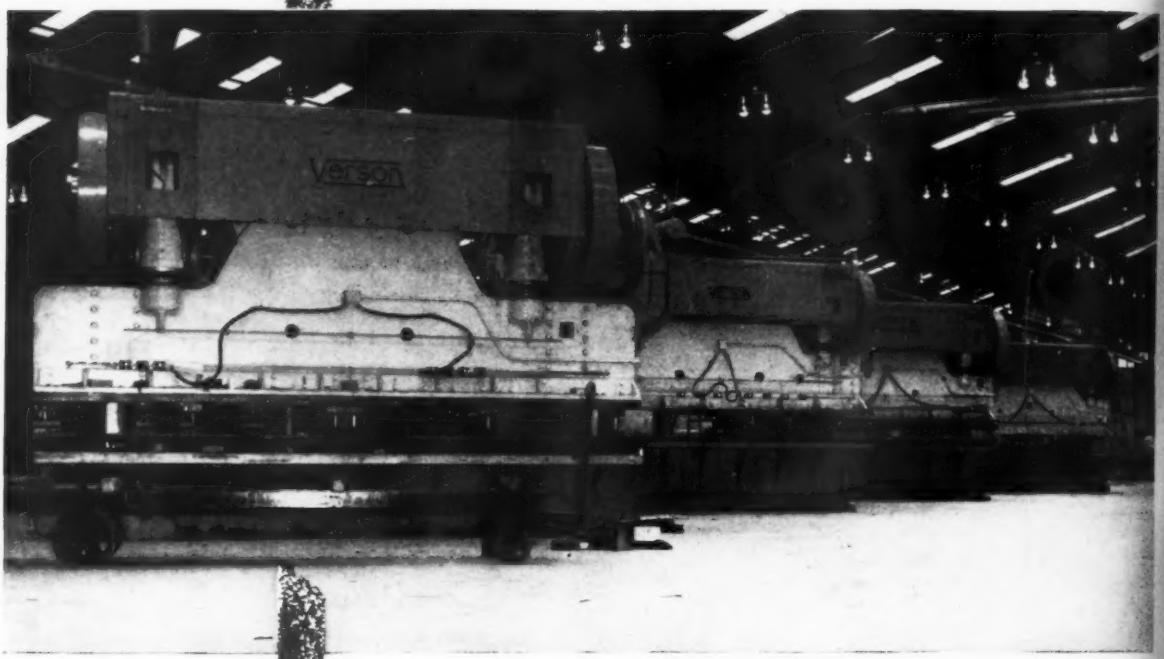

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